



JC08 Rec'd PCT/PTO 26 FEB 2001  
09/763704

TRANSMITTAL LETTER TO THE UNITED STATES ATTORNEY'S DOCKET NUMBER 49365

DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

INTERNATIONAL APPLICATION NO. PCT/EP 99/06322 INTERNATIONAL FILING DATE 27 August 1999 PRIORITY DATE CLAIMED 8 September 1998

TITLE OF INVENTION: CYCLOHEXENONEQUINOLINOYL DERIVATIVES

APPLICANT(S) FOR DO/EO/US Matthias WITSCHEL, Ulf MISSLITZ, Ernst BAUMANN, Wolfgang von DEYN, Klaus LANGEMANN, Guido MAYER, Ulf NEIDLEIN, Roland GOETZ, Norbert GOETZ, Michael RACK, Stefan ENGEL, Martina OTTEN, Karl-Otto WESTPHALEN, Helmut WALTER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. /X/ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.

2. // This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.

3. /X/ This express request to begin national examination procedures (35 U.S.C.371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).

4. /x/ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. /X/ A copy of the International Application as filed (35 U.S.C. 371(c)(2)).  
a./X/ is transmitted herewith (required only if not transmitted by the International Bureau).  
b.// has been transmitted by the International Bureau.  
c.// is not required, as the application was filed in the United States Receiving Office (RO/USO).

6. /X/ A translation of the International Application into English (35 U.S.C. 371(c)(2)).

7. // Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).  
a.// are transmitted herewith (required only if not transmitted by the International Bureau).  
b.// have been transmitted by the International Bureau.  
c.// have not been made; however, the time limit for making such amendments has NOT expired.  
d.// have not been made and will not be made.

8. // A translation of the amendments to the claims under PCT Article 19(35 U.S.C. 371(c)(3)).

9. /X/ An oath or declaration of the inventor(s)(35 U.S.C. 171(c)(4)).

10.// A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. / / An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

12. /X/ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. /X/ A FIRST preliminary amendment.  
// A SECOND or SUBSEQUENT preliminary amendment.

14. // A substitute specification.

15. // A change of power of attorney and/or address letter.

16. /x/ Other items or information.  
International Search Report  
International Preliminary Examination Report

09/76370

JC02 Rec'd PCT/PTO 26 FEB 2

U.S. Appln. No. (If Known) INTERNATIONAL APPLN. NO.  
PCT/EP99/06322

ATTORNEY'S DOCKET NO.  
49365

17. /X/ The following fees are submitted		<u>CALCULATIONS</u>	<u>PTO USE ONLY</u>
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):			
Search Report has been prepared by the			
EPO or JPO.....	\$860.00	860.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482).....	\$750.00		
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....	\$700.00		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO .....	\$ 970.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied pro -visions of PCT Article 33(2)-(4).....	\$96.00		

**ENTER APPROPRIATE BASIC FEE AMOUNT = \$ 860.00**

Surcharge of \$130.00 for furnishing the oath or declaration  
later than 1/20/30 months from the earliest  
claimed priority date (37 CFR 1.492(e)).

<u>Claims</u>	<u>Number Filed</u>	<u>Number Extra</u>	<u>Rate</u>	
Total Claims	13	-20	X\$18.	
Indep. Claims	1	-3	X\$80.	
Multiple dependent claim(s)(if applicable)		+270.		
<b>TOTAL OF ABOVE CALCULATION</b>			= 860.00	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).				
<b>SUBTOTAL</b>		= 860.00		
Processing fee of \$130. for furnishing the English translation later than 1/20/30 months from the earliest claimed priority date (37 CFR 1.492(f)).				
<b>TOTAL NATIONAL FEE</b>		= 860.00		
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) \$40.00 per property				
<b>TOTAL FEES ENCLOSED</b>		= \$ 900.00		

Amount to be  
refunded: \$ \_\_\_\_\_  
Charged \$ \_\_\_\_\_

- a./X/ A check in the amount of \$ 900. to cover the above fees is enclosed.
- b./ / Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c./X/ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 11-0345. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status.

**SEND ALL CORRESPONDENCE TO:**

KEIL & WEINKAUF  
1101 Connecticut Ave., N.W.  
Washington, D. C. 20036

SIGNATURE

Herbert B. Keil  
Herbert B. Keil  
NAME  
Registration No. 18,967

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of )  
WITSCHEL et al. ) BOX PCT  
)  
International Application )  
PCT/EP 99/06322 )  
)  
Filed: August 27, 1999 )  
)  
For: CYCLOHEXENONEQUINOLINOYL DERIVATIVES

PRELIMINARY AMENDMENT

Honorable Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

Sir:

Prior to examination, kindly amend the above-identified application as follows:

IN THE CLAIMS

3. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1 [or 2], where  
R<sup>5</sup> is halogen, OR<sup>7</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocycll which may be partially or fully halogenated  
and/or may carry one to three of the following radicals:  
nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy.

4. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1 [claims 1 to 3],  
where  
R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, (C<sub>1</sub>-C<sub>20</sub>-alkylthio)carbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl,  
phenyl, phenylcarbonyl or phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, where the phenyl radical of  
the three last-mentioned substituents may be partially or fully halogenated and/or may  
carry one to three of the following radicals:  
nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy ;  
R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-alkoxy;  
R<sup>11</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl.

5. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1 [claims 1 to 4], where  
R<sup>6</sup> is nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)methyl, di-  
(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)(C<sub>1</sub>-C<sub>6</sub>-alkylthio)-  
methyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyloxy, C<sub>1</sub>-C<sub>6</sub>-

alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl or C<sub>1</sub>-C<sub>6</sub>-haloalkoxycarbonyl;

or

two radicals R<sup>6</sup>, which are linked to the same carbon, together form an -O-(CH<sub>2</sub>)<sub>m</sub>-O-, -O-(CH<sub>2</sub>)<sub>m</sub>-S-, -S-(CH<sub>2</sub>)<sub>m</sub>-S-, -O-(CH<sub>2</sub>)<sub>n</sub>- or -S-(CH<sub>2</sub>)<sub>n</sub> chain which may be substituted by one to three radicals from the following group :

halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

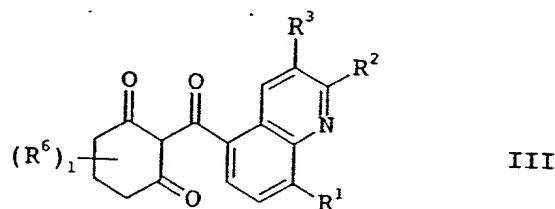
two radicals R<sup>6</sup>, which are linked to the same carbon, together form a -(CH<sub>2</sub>)<sub>p</sub> chain which may be interrupted by oxygen or sulfur and/or may be substituted by one to four radicals from the following group :

halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl ;

or

two radicals R<sup>6</sup>, which are linked to the same carbon, together with this carbon form a carbonyl group.

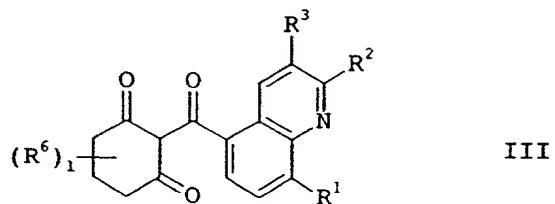
6. A process for preparing compounds of the formula I as claimed in claim 1 [claims 1 to 5] where R<sup>5</sup> = halogen, which comprises reacting a cyclohexanedione derivative of the formula III,



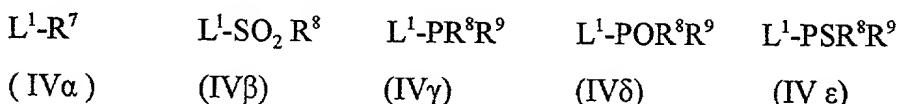
where the variables R<sup>1</sup> to R<sup>3</sup>, R<sup>6</sup> and 1 are each as defined in claim 1 [claims 1 to 5], with a halogenating agent.

7. A process for preparing compounds of the formula I as claimed in claim 1 [claims 1 to 5] where

$R^5 = OR^7, OSO_2R^8, OPR^8R^9, OPOR^8R^9$  or  $OPSR^8R^9$ , which comprises reacting a cyclohexanedione derivative of the formula III,

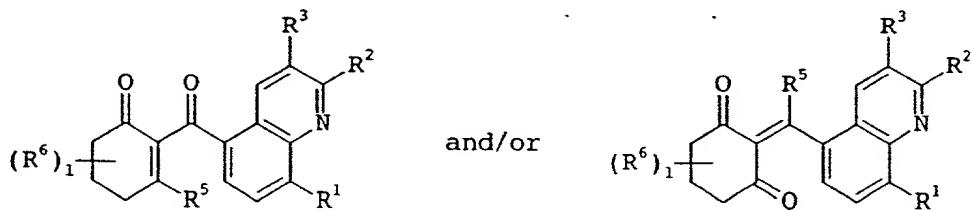


where the variables  $R^1$  to  $R^3$ ,  $R^6$  and 1 are each as defined in claim 1 [claims 1 to 5], with a compound of the formula IV $\alpha$ , IV $\beta$ , IV $\gamma$ , IV $\delta$  or IV $\varepsilon$ ,



where the variables  $R^7$  to  $R^9$  are each as defined in claim 1 [claims 1 to 5] and  $L^1$  is a nucleophilically replaceable leaving group.

8. A process for preparing compounds of the formula I as claimed in claim 1 [claims 1 to 5] where  $R^5 = OR^7, SR^7, POR^8R^9, NR^{10}R^{11}, ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl), which comprises reacting a compound of the formula I  $\alpha$  ( $\equiv$  I where  $R^5 =$  halogen,  $OSO_2R^8$ ),



I where  $R^5 =$  halogen or  $OSO_2R^8$

where the variables  $R^1$  to  $R^3$ ,  $R^6$  and 1 are each as defined in claim 1 [claims 1 to 5], with a compound

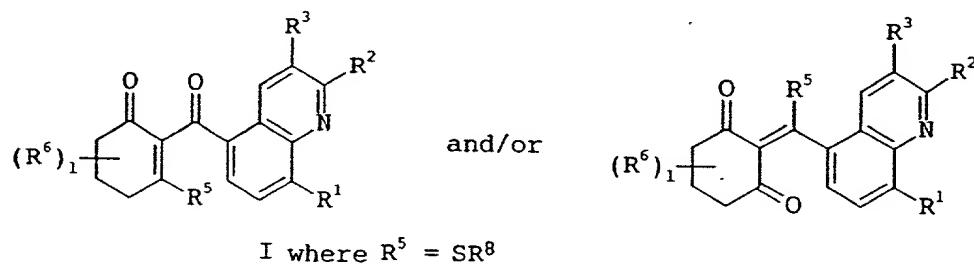
of the formula  $V\alpha, V\beta, V\gamma, V\delta, V\epsilon, V\eta, V\delta$ ,

$HOR^7$	$HSR^7$	$HPOR^8R^9$	$HNR^{10}R^{11}$	$HONR^{11}R^{12}$
$(V\alpha)$	$(V\beta)$	$(V\gamma)$	$(V\delta)$	$(V\epsilon)$
H(N-linked heterocyclyl) $V\eta$			H(ON-linked heterocyclyl) $V\delta$	

where the variables  $R^7$  to  $R^{12}$  are each as defined in claim 1 [claims 1 to 5], if

appropriate in the presence of a base.

9. A process for preparing compounds of the formula I as claimed in claim 1 [claims 1, 2 or 5], where  $R^5 = SOR^8, SO_2R^8$ , which comprises reacting a compound of the formula  $I\beta$  ( $\equiv I$  where  $R^5 = SR^8$ ),



where the variables  $R^1$  to  $R^8$  and 1 are each as defined in claim 1 [claims 1, 2 or 5], with an oxidizing agent.

10. A composition, comprising a herbicidally effective amount of at least one cyclohexenone-equinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 1 [claims 1 to 5] and auxiliaries which are customarily used for formulating crop protection agents.

11. A process for preparing compositions as claimed in claim 10, which comprises mixing a

herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I [as claimed in claims 1 to 5] and auxiliaries which are customarily used for formulating crop protection agents.

12. A method for controlling undesirable vegetation, which comprises allowing a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 1 [claims 1 to 5] to act on plants, their habitat and/or on seeds.
13. The use of cyclohexenonequinolinoyl derivatives of the formula I or their agriculturally useful salts as claimed in claim 1 [claims 1 to 5] as herbicides.

REMARKS

The claims have been amended to eliminate multiple dependency and to put them in better form for U.S. filing. No new matter is included. A clean copy of the claims is attached.

Favorable action is solicited.

Respectfully submitted,

KEIL & WEINKAUF



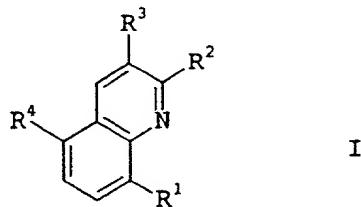
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CLAIMS AS FILED IN PRELIMINARY AMENDMENT 0Z 49365

1. A cyclohexenonequinolinoyl derivative of the formula I

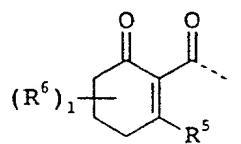


where:

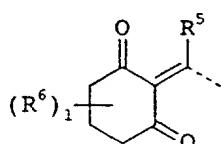
$R^1$  is hydrogen, nitro, halogen, cyano,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl,  $C_1$ - $C_6$ -alkoxyiminomethyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkylthio,  $C_1$ - $C_6$ -haloalkylthio,  $C_1$ - $C_6$ -alkylsulfinyl,  $C_1$ - $C_6$ -haloalkylsulfinyl,  $C_1$ - $C_6$ -alkylsulfonyl,  $C_1$ - $C_6$ -haloalkylsulfonyl, aminosulfonyl,  $N$ -( $C_1$ - $C_6$ -alkyl)aminosulfonyl,  $N$ ,  $N$ -di-( $C_1$ - $C_6$ -alkyl) aminosulfonyl,  $N$ -( $C_1$ - $C_6$ -alkylsulfonyl)amino,  $N$ -( $C_1$ - $C_6$ -haloalkylsulfonyl)amino,  $N$ -( $C_1$ - $C_6$ -alkyl)- $N$ -( $C_1$ - $C_6$ -alkylsulfonyl)amino,  $N$ -( $C_1$ - $C_6$ -alkyl)- $N$ -( $C_1$ - $C_6$ -haloalkylsulfonyl)amino, phenoxy, heterocyclyoxy, phenylthio or heterocyclthio, where the four last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the following substituents : nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

$R^2$ ,  $R^3$  are hydrogen,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl or halogen;

$R^4$  is a compound IIa or IIb



IIa



IIb

where

$R^5$  is halogen,  $OR^7$ ,  $SR^7$ ,  $SOR^8$ ,  $SO_2R^8$ ,  $OSO_2R^8$ ,  $POR^8R^9$ ,  $OPR^8R^9$ ,  $OPOR^8R^9$ ,  $OPSR^8R^9$ ,  $NR^{10}R^{11}$ ,  $ONR^{11}R^{12}$ , N-linked heterocycl or O-(N-linked heterocycl), where the heterocycl radical of the two last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

$R^6$  is nitrol, halogen, cyano,  $C_1$ - $C_6$ -alkyl,  
 $C_1$ - $C_6$ -haloalkyl, di-( $C_1$ - $C_6$ -alkoxy)methyl,  
di-( $C_1$ - $C_6$ -alkylthio)methyl,  
( $C_1$ - $C_6$ -alkoxy)( $C_1$ - $C_6$ -alkylthio)methyl, hydroxyl,  
 $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  
 $C_1$ - $C_6$ -alkoxycarbonyloxy,  $C_1$ - $C_6$ -alkylthio,  
 $C_1$ - $C_6$ -haloalkylthio,  $C_1$ - $C_6$ -alkylsulfinyl,  
 $C_1$ - $C_6$ -haloalkylsulfinyl,  $C_1$ - $C_6$ -alkylsulfonyl,  
 $C_1$ - $C_6$ -haloalkylsulfonyl,  $C_1$ - $C_6$ -alkylcarbonyl,  
 $C_1$ - $C_6$ -haloalkylcarbonyl,  $C_1$ - $C_6$ -alkoxycarbonyl or  
 $C_1$ - $C_6$ -haloalkoxycarbonyl;

or

two radicals  $R^6$ , which are linked to the same carbon,

together form an  $-O-(CH_2)_m-O-$ ,  $-O-(CH_2)_m-S-$ ,  $-S-(CH_2)_m-S-$ ,  $-O-(CH_2)_n-$  or  $-S-(CH_2)_n$  chain which may be substituted by one to three radicals from the following group:

halogen, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl or  $C_1$ - $C_4$ -alkoxycarbonyl;

or

two radicals  $R^6$ , which are linked to the same carbon,

together form a  $-(CH_2)_p$  chain which may be interrupted by oxygen or sulfur and/or may be substituted by one to four radicals from the following group:

halogen, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl or  $C_1$ - $C_4$ -alkoxycarbonyl;

or

two radicals  $R^6$ , which are linked to the same carbon,

together form a methylidene group which may be substituted by one or two radicals

from the following group:

halogen, hydroxyl, formyl, cyano,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkylthio,  $C_1$ - $C_6$ -haloalkylthio,  $C_1$ - $C_6$ -alkylsulfinyl,  $C_1$ - $C_6$ -haloalkylsulfinyl,  $C_1$ - $C_6$ -alkylsulfonyl or  $C_1$ - $C_6$ -haloalkylsulfonyl;

or

two radicals  $R^6$ , which are linked to the same carbon,  
together with this carbon form a carbonyl group;

or

two radicals  $R^6$ , which are linked to different carbons,  
together form a  $-(CH_2)_n$  chain which may be substituted by one to three radicals from  
the following group:  
halogen,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -alkoxy, hydroxyl or  $C_1$ - $C_6$ -alkoxycarbonyl;

  
 $R^7$  is  $C_1$ - $C_6$ -alkyl,  $C_3$ - $C_6$ -alkenyl,  $C_3$ - $C_6$ -haloalkenyl,  
 $C_3$ - $C_6$ -alkynyl,  $C_3$ - $C_6$ -haloalkynyl,  $C_3$ - $C_6$ -cyloalkyl,  
 $C_1$ - $C_{20}$ -alkylcarbonyl,  $C_2$ - $C_6$ -alkenylcarbonyl,  
 $C_2$ - $C_6$ -alkynylcarbonyl,  $C_3$ - $C_6$ -cyloalkylcarbonyl,  
 $C_1$ - $C_6$ -alkoxycarbonyl,  $C_3$ - $C_6$ -alkenyloxycarbonyl,  
 $C_3$ - $C_6$ -alkynyloxycarbonyl,  
 $(C_1-C_{20}$ -alkylthio)carbonyl,  
 $C_1$ - $C_6$ -alkylaminocarbonyl,  
 $C_3$ - $C_6$ -alkenylaminocarbonyl,  
 $C_3$ - $C_6$ -alkynylaminocarbonyl,  
 $N,N$ -di- $(C_1-C_6$ -alkyl)aminocarbonyl,  
 $N-(C_3-C_6$ -alkenyl)- $N-(C_1-C_6$ -alkyl) aminocarbonyl ,  
 $N-(C_3-C_6$ -alkynyl)- $N-(C_1-C_6$ -alkyl) aminocarbonyl ,  
 $N-(C_1-C_6$ -alkoxy)-  
 $N-(C_1-C_6$ -alkyl) aminocarbonyl ,  $N-(C_3-C_6$ -alkenyl )-  
 $N-(C_1-C_6$ -alkoxy) aminocarbonyl ,  $N-(C_3-C_6$ -alkynyl )-  
 $N-(C_1-C_6$ -alkoxy ) aminocarbonyl, di- $(C_1-C_6$ -alkyl )-

aminothiocarbonyl,  $C_1$ - $C_6$ -alkylcarbonyl- $C_1$ - $C_6$ -alkyl,

$C_1$ - $C_6$ -alkoxyimino- $C_1$ - $C_6$ -alkyl,

$N$ -( $C_1$ - $C_6$ -alkylamino) imino- $C_1$ - $C_6$ -alkyl or

$N,N$ -di-( $C_1$ - $C_6$ -alkylamino)imino- $C_1$ - $C_6$ -alkyl, where

the above-mentioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three of the following groups:

cyano,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -alkylthio, di-( $C_1$ - $C_4$ -alkyl)amino,  $C_1$ - $C_4$ -alkylcarbonyl,

$C_1$ - $C_4$ -alkoxycarbonyl,  $C_1$ - $C_4$ -alkoxy- $C_1$ - $C_4$ -alkoxycarbonyl, di-( $C_1$ - $C_4$ -alkyl)amino- $C_1$ -

$C_4$ -alkoxycarbonyl, hydroxycarbonyl,  $C_1$ - $C_4$ -alkylaminocarbonyl, di-( $C_1$ - $C_4$ -

alkyl)aminocarbonyl, aminocarbonyl,  $C_1$ - $C_4$ -alkylcarbonyloxy or  $C_3$ - $C_6$ -cycloalkyl;

phenyl, heterocycl, phenyl- $C_1$ - $C_6$ -alkyl, heterocycl- $C_1$ - $C_6$ -alkyl, phenylcarbonyl- $C_1$ -

$C_6$ -alkyl, heterocyclcarbonyl- $C_1$ - $C_6$ -alkyl, phenylcarbonyl, heterocyclcarbonyl,

phenoxy carbonyl, heterocyclloxy carbonyl, phenoxythiocarbonyl,

heterocyclloxythiocarbonyl, phenoxy- $C_1$ - $C_6$ -alkylcarbonyl, heterocyclloxy- $C_1$ - $C_6$ -

alkylcarbonyl, phenylarminocarbonyl,  $N$ -( $C_1$ - $C_6$ -alkyl)- $N$ -(phenyl)arminocarbonyl,

heterocycllarminocarbonyl,  $N$ -( $C_1$ - $C_6$ -alkyl)- $N$ -(heterocycl)arminocarbonyl, phenyl-

$C_2$ - $C_6$ -alkenylcarbonyl or heterocycl- $C_2$ - $C_6$ -alkenylcarbonyl, where the phenyl and

the heterocycl radical of the 20 last-mentioned substituents may be partially or fully

halogenated and/or may carry one to three of the following radicals:

nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -halogenalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

$R^8, R^9$  are  $C_1$ - $C_6$ -alkyl,  $C_3$ - $C_6$ -alkenyl,  $C_3$ - $C_6$ -haloalkenyl,  $C_3$ - $C_6$ -alkynyl,  $C_3$ - $C_6$ -haloalkynyl,  $C_3$ - $C_6$ -cycloalkyl, hydroxyl,  $C_1$ - $C_6$ -alkoxy, amino,  $C_1$ - $C_6$ -alkylamino,  $C_1$ - $C_6$ -haloalkylamino, di-( $C_1$ - $C_6$ -alkyl)amino or di-( $C_1$ - $C_6$ -haloalkyl)amino, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three of the following groups:

cyano,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -alkylthio, di-( $C_1$ - $C_4$ -alkyl)amino,  $C_1$ - $C_4$ -alkylcarbonyl,

$C_1$ - $C_4$ -alkoxycarbonyl,  $C_1$ - $C_4$ -alkoxy- $C_1$ - $C_4$ -alkoxycarbonyl, di-( $C_1$ - $C_4$ -alkyl)amino- $C_1$ -

$C_4$ -alkoxycarbonyl,

hydroxycarbonyl,  $C_1$ - $C_4$ -alkylaminocarbonyl, di-( $C_1$ - $C_4$ -alkyl)aminocarbonyl,

aminocarbonyl,  $C_1$ - $C_4$ -alkylcarbonyloxy or  $C_3$ - $C_6$ -cycloalkyl;

phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenoxy, heterocyclloxy, where the phenyl and the heterocyclyl radical of the last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>3</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-alkynyloxy, amino, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonylamino, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three radicals from the following group:  
cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl; phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl or heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, where the phenyl or heterocyclyl radical of the four last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>11</sup>,R<sup>12</sup>are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl;

- l is 0 to 6;
- m is 2 to 4;
- n is 1 to 5;
- p is 2 to 5;

and their agriculturally useful salts.

2. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1 where

R<sup>1</sup> is halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, heterocyclloxy or phenylthio, where the two last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the substituents mentioned below:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>5</sup> is halogen, OR<sup>7</sup>, SR<sup>7</sup>, SOR<sup>8</sup>, SO<sub>2</sub>R<sup>8</sup>, OSO<sub>2</sub>R<sup>8</sup>, OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup> OPSR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup> or N-

bonded heterocycll which may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy .

3. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1, where

R<sup>5</sup> is halogen, OR<sup>7</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocycll which may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy.

4. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1, where

R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl,

C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, (C<sub>1</sub>-C<sub>20</sub>-alkylthio)carbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, phenyl, phenylcarbonyl or phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, where the phenyl radical of the three last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy ;

R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-alkoxy;

R<sup>11</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl.

5. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1, where

R<sup>6</sup> is nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)methyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)(C<sub>1</sub>-C<sub>6</sub>-alkylthio)-methyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyloxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl or C<sub>1</sub>-C<sub>6</sub>-haloalkoxycarbonyl;

or

two radicals R<sup>6</sup>, which are linked to the same carbon, together form an -O-(CH<sub>2</sub>)<sub>m</sub>-O-, -O-(CH<sub>2</sub>)<sub>m</sub>-S-, -S-(CH<sub>2</sub>)<sub>m</sub>-S-, -O-(CH<sub>2</sub>)<sub>n</sub>- or -S-(CH<sub>2</sub>)<sub>n</sub> chain which may be substituted by one to three radicals from the following group :

halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

two radicals R<sup>6</sup>, which are linked to the same carbon, together form a -(CH<sub>2</sub>)<sub>p</sub> chain which may be interrupted by oxygen or sulfur and/or may be substituted by one to

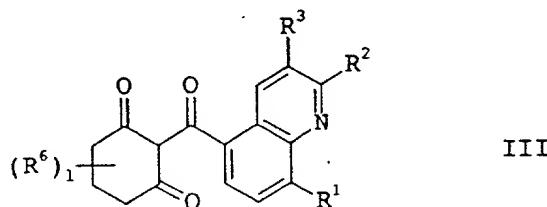
four radicals from the following group :

halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl ;

or

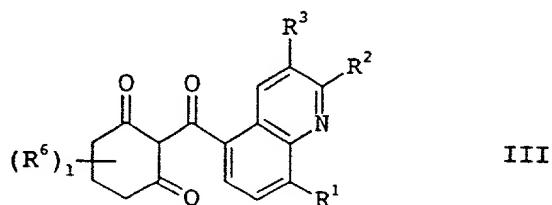
two radicals R<sup>6</sup>, which are linked to the same carbon, together with this carbon form a carbonyl group.

6. A process for preparing compounds of the formula I as claimed in claim 1 where R<sup>5</sup> = halogen, which comprises reacting a cyclohexanedione derivative of the formula III,



where the variables R<sup>1</sup> to R<sup>3</sup>, R<sup>6</sup> and 1 are each as defined in claim 1, with a halogenating agent.

7. A process for preparing compounds of the formula I as claimed in claim 1 where R<sup>5</sup> = OR<sup>7</sup>, OSO<sub>2</sub>R<sup>8</sup>, OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup> or OPSR<sup>8</sup>R<sup>9</sup>, which comprises reacting a cyclohexanedione derivative of the formula III,

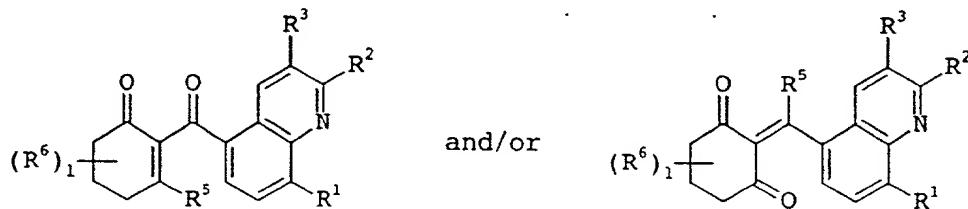


where the variables R<sup>1</sup> to R<sup>3</sup>, R<sup>6</sup> and 1 are each as defined in claim 1, with a compound of the formula IV $\alpha$ , IV $\beta$ , IV $\gamma$ , IV $\delta$  or IV $\epsilon$ ,

L<sup>1</sup>-R<sup>7</sup>      L<sup>1</sup>-SO<sub>2</sub>R<sup>8</sup>      L<sup>1</sup>-PR<sup>8</sup>R<sup>9</sup>      L<sup>1</sup>-POR<sup>8</sup>R<sup>9</sup>      L<sup>1</sup>-PSR<sup>8</sup>R<sup>9</sup>  
(IV $\alpha$ )      (IV $\beta$ )      (IV $\gamma$ )      (IV $\delta$ )      (IV $\epsilon$ )

where the variables R<sup>7</sup> to R<sup>9</sup> are each as defined in claim 1 and L<sup>1</sup> is a nucleophilically replaceable leaving group.

8. A process for preparing compounds of the formula I as claimed in claim 1 where R<sup>5</sup> = OR<sup>7</sup>, SR<sup>7</sup>, POR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup>, ONR<sup>11</sup>R<sup>12</sup>, N-linked heterocyclyl or O-(N-linked heterocyclyl), which comprises reacting a compound of the formula I  $\alpha$  ( $\equiv$  I where R<sup>5</sup> = halogen, OSO<sub>2</sub>R<sup>8</sup>),



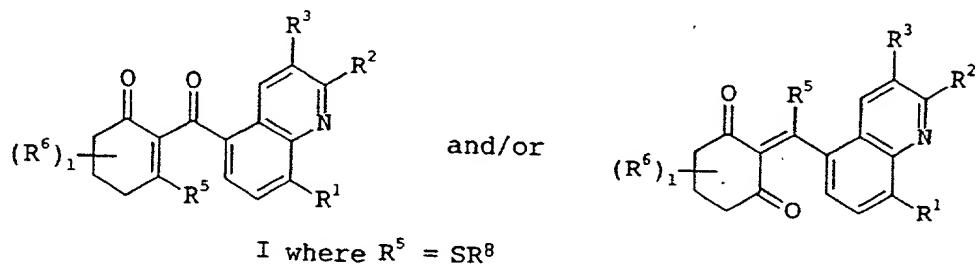
I where R<sup>5</sup> = halogen or OSO<sub>2</sub>R<sup>8</sup>

where the variables R<sup>1</sup> to R<sup>3</sup>, R<sup>6</sup> and 1 are each as defined in claim 1, with a compound of the formula V $\alpha$ , V $\beta$ , V $\gamma$ , V $\delta$ , V $\varepsilon$ , V $\eta$ , V $\vartheta$ ,

HOR <sup>7</sup> (V $\alpha$ )	HSR <sup>7</sup> (V $\beta$ )	HPOR <sup>8</sup> R <sup>9</sup> (V $\gamma$ )	HNR <sup>10</sup> R <sup>11</sup> (V $\delta$ )	HONR <sup>11</sup> R <sup>12</sup> (V $\varepsilon$ )
H(N-linked heterocyclyl) V $\eta$			H(ON-linked heterocyclyl) V $\vartheta$	

where the variables R<sup>7</sup> to R<sup>12</sup> are each as defined in claim 1, if appropriate in the presence of a base.

9. A process for preparing compounds of the formula I as claimed in claim 1, where R<sup>5</sup> = SOR<sup>8</sup>, SO<sub>2</sub>R<sup>8</sup>, which comprises reacting a compound of the formula I $\beta$  ( $\equiv$  I where R<sup>5</sup> = SR<sup>8</sup>),



where the variables R<sup>1</sup> to R<sup>8</sup> and 1 are each as defined in claim 1, with an oxidizing agent.

10. A composition, comprising a herbicidally effective amount of at least one cyclohexenone-quinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 1 and auxiliaries which are customarily used for formulating crop protection agents.

11. A process for preparing compositions as claimed in claim 10, which comprises mixing a herbicidally effective amount of at least one cyclohexenone-quinolinoyl derivative of the formula I or an agriculturally useful salt of formula I and auxiliaries which are customarily used for formulating crop protection agents.

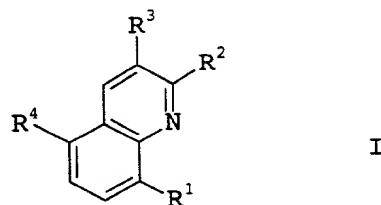
12. A method for controlling undesirable vegetation, which comprises allowing a herbicidally effective amount of at least one cyclohexenone-quinolinoyl derivative of the formula I or an agriculturally useful salt of formula I as claimed in claim 1 to act on plants, their habitat and/or on seeds.

13. The use of cyclohexenone-quinolinoyl derivatives of the formula I or their agriculturally useful salts as claimed in claim 1 as herbicides.

## Cyclohexenonequinolinoyl derivatives

5 The present invention relates to novel cyclohexenonequinolinoyl derivatives of the formula I,

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where:

20 R<sup>1</sup> is hydrogen, nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyiminomethyl,

25 C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio,

C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl,

C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl,

C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, aminosulfonyl,

N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminosulfonyl,

N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminosulfonyl,

N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino,

N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino,

N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino,

N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino,

phenoxy, heterocyclyoxy, phenylthio or

heterocyclylthio, where the four last-mentioned

radicals may be partially or fully halogenated

and/or may carry one to three of the following

substituents:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl,

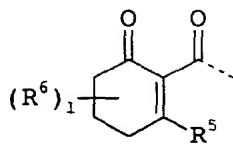
35 C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

40 R<sup>2</sup>, R<sup>3</sup> are hydrogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl or

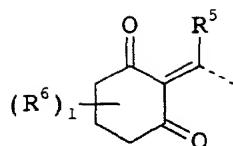
halogen;

45

R<sup>4</sup> is a compound IIa or IIb



IIa



IIb

where

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$R^5$  is halogen,  $OR^7$ ,  $SR^7$ ,  $SOR^8$ ,  $SO_2R^8$ ,  $OSO_2R^8$ ,  $POR^8R^9$ ,  $OPR^8R^9$ ,  $OPOR^8R^9$ ,  $OPSR^8R^9$ ,  $NR^{10}R^{11}$ ,  $ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl), where the heterocyclyl radical of the two last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

20

$R^6$  is nitro, halogen, cyano,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl, di-( $C_1$ - $C_6$ -alkoxy)methyl, di-( $C_1$ - $C_6$ -alkylthio)methyl, ( $C_1$ - $C_6$ -alkoxy)( $C_1$ - $C_6$ -alkylthio)methyl, hydroxy,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkoxycarbonyloxy,  $C_1$ - $C_6$ -alkylthio,  $C_1$ - $C_6$ -haloalkylthio,  $C_1$ - $C_6$ -alkylsulfinyl,  $C_1$ - $C_6$ -haloalkylsulfinyl,  $C_1$ - $C_6$ -alkylsulfonyl,  $C_1$ - $C_6$ -haloalkylsulfonyl,  $C_1$ - $C_6$ -alkylcarbonyl,  $C_1$ - $C_6$ -haloalkylcarbonyl,  $C_1$ - $C_6$ -alkoxycarbonyl or  $C_1$ - $C_6$ -haloalkoxycarbonyl;

or

35

two radicals  $R^6$ , which are linked to the same carbon, together form an  $-O-(CH_2)_m-O-$ ,  $-O-(CH_2)_m-S-$ ,  $-S-(CH_2)_m-S-$ ,  $-O-(CH_2)_n-$  or  $-S-(CH_2)_n$  chain which may be substituted by one to three radicals from the following group:  
halogen, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl or  $C_1$ - $C_4$ -alkoxycarbonyl;

or

45

two radicals  $R^6$ , which are linked to the same carbon, together form a  $-(CH_2)_p$  chain which may be interrupted by oxygen or sulfur and/or may be substituted by one to four radicals from the following group:

5 following group:  
halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or  
C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

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two radicals  $R^6$ , which are linked to the same carbon, together form a methyldene group which may be substituted by one or two radicals from the following group:

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halogen, hydroxyl, formyl, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl or C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl;

20

or

35

two radicals  $R^6$ , which are linked to the same carbon, together with this carbon form a carbonyl group;

or

30

two radicals  $R^6$ , which are linked to different carbons, together form a  $-(CH_2)_n$  chain which may be substituted by one to three radicals from the following group:

35

halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, hydroxyl or C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl;

40

is C<sub>1</sub>–C<sub>6</sub>–alkyl, C<sub>3</sub>–C<sub>6</sub>–alkenyl, C<sub>3</sub>–C<sub>6</sub>–haloalkenyl, C<sub>3</sub>–C<sub>6</sub>–alkynyl, C<sub>3</sub>–C<sub>6</sub>–haloalkynyl, C<sub>3</sub>–C<sub>6</sub>–cycloalkyl, C<sub>1</sub>–C<sub>6</sub>–alkylcarbonyl, C<sub>2</sub>–C<sub>6</sub>–alkenylcarbonyl,

40

C<sub>1</sub>-C<sub>20</sub>-alkylicarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkynylcarbonyl,  
C<sub>2</sub>-C<sub>6</sub>-alkynylcarbonyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkylcarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkenyloxycarbonyl,  
C<sub>3</sub>-C<sub>6</sub>-alkynyloxycarbonyl,  
(C<sub>1</sub>-C<sub>6</sub>-alkylthio)carbonyl

45

C<sub>3</sub>–C<sub>6</sub>-alkenylaminocarbonyl,  
C<sub>3</sub>–C<sub>6</sub>-alkynylaminocarbonyl,  
N,N-di-(C<sub>1</sub>–C<sub>6</sub>-alkyl)aminocarbonyl,

N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl,  
 N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl,  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl,  
 N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl,  
 N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl,  
 5 di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-aminothiocarbonyl,  
 C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 C<sub>1</sub>-C<sub>6</sub>-alkoxyimino-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl or  
 10 N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl, where  
 the abovementioned alkyl, cycloalkyl and alkoxy  
 radicals may be partially or fully halogenated  
 and/or may carry one to three of the following  
 groups:  
 15 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-  
 alkyl)amino, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl,  
 C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl,  
 C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl,  
 20 di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl,  
 hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl,  
 di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, aminocarbonyl,  
 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;  
 25 phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 phenylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 heterocyclylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenylcarbonyl,  
 heterocyclylcarbonyl, phenoxy carbonyl,  
 30 heterocycloloxy carbonyl, phenoxythiocarbonyl,  
 heterocycloloxythiocarbonyl,  
 phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
 heterocycloloxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
 phenylaminocarbonyl,  
 35 N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(phenyl)aminocarbonyl,  
 heterocyclylaminocarbonyl,  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(heterocyclyl)aminocarbonyl,  
 phenyl-C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl or  
 40 heterocyclyl-C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl, where the  
 phenyl and the heterocyclyl radical of the 20  
 last-mentioned substituents may be partially or  
 fully halogenated and/or may carry one to three of  
 the following radicals:  
 nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl,  
 C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;  
 45

R<sup>8</sup>, R<sup>9</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, amino, C<sub>1</sub>-C<sub>6</sub>-alkylamino, C<sub>1</sub>-C<sub>6</sub>-haloalkylamino, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino or di-(C<sub>1</sub>-C<sub>6</sub>-haloalkyl)amino, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three of the following groups:

5 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, 10 hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

15 phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenoxy, heterocyclxyloxy, where the phenyl and the heterocyclyl radical of the last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

20 nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

25 R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>3</sub>-C<sub>6</sub>-alkenyloxy, C<sub>3</sub>-C<sub>6</sub>-alkynyloxy, amino, C<sub>1</sub>-C<sub>6</sub>-alkylamino, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonylamino, 30 where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three radicals from the following group:

35 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, 40 di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, hydroxycarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylaminocarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

45

phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl or heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, where the phenyl or heterocyclyl radical of the four last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

10 R<sup>11</sup>, R<sup>12</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl or C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl;

15 l is 0 to 6;

m is 2 to 4;

n is 1 to 5;

20 p is 2 to 5;

and their agriculturally useful salts.

25 Moreover, the invention relates to processes for preparing compounds of the formula I, to compositions comprising them and to the use of these derivatives or the compositions comprising them for controlling harmful plants.

30 The literature, for example WO 98/12 180 and EP-A 283 261, discloses quinolinoyl or fused phenyl derivatives which are linked to an unsubstituted or substituted (1-hydroxy-3-oxo-cyclohex-1-en-2-yl)carbonyl radical. However, the herbicidal properties of the prior art compounds and their 35 compatibility with crop plants are not entirely satisfactory.

It is an object of the present invention to provide other biologically, in particular herbicidally, active compounds.

40 We have found that this object is achieved by the cyclohexenonequinolinoyl derivatives of the formula I and their herbicidal action.

45 Furthermore, we have found herbicidal compositions which comprise the compounds I and have very good herbicidal action. Moreover, we have found processes for preparing these compositions and

methods for controlling undesirable vegetation using the compounds I.

Depending on the substitution pattern, the compounds of the formula I may contain one or more chiral centers, in which case they are present as enantiomers or mixtures of diastereomers. The invention provides both the pure enantiomers or diastereomers and their mixtures.

10 The compounds of the formula I may also be present in the form of their agriculturally useful salts, where the type of salt is usually immaterial. In general, the salts of those cations and the acid addition salts of those acids are suitable whose cations and anions, respectively, do not negatively affect the herbicidal 15 action of the compounds I.

Suitable cations are, in particular, ions of the alkali metals, preferably lithium, sodium and potassium, of the alkaline earth 20 metals, preferably calcium and magnesium, and of the transition metals, preferably manganese, copper, zinc and iron, and also ammonium, where, if desired, one to four hydrogen atoms may be replaced by C<sub>1</sub>-C<sub>4</sub>-alkyl, hydroxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, hydroxy-C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl 25 or benzyl, preferably ammonium, dimethylammonium, diisopropylammonium, tetramethylammonium, tetrabutylammonium, 2-(2-hydroxyeth-1-oxy)eth-1-ylammonium, di(2-hydroxyeth-1-yl)ammonium, trimethylbenzylammonium, furthermore phosphonium ions, sulfonium ions, preferably 30 tri(C<sub>1</sub>-C<sub>4</sub>-alkyl)sulfonium and sulfoxonium ions, preferably tri(C<sub>1</sub>-C<sub>4</sub>-alkyl)sulfoxonium.

Anions of useful acid addition salts are primarily chloride, bromide, fluoride, hydrogen sulfate, sulfate, dihydrogen 35 phosphate, hydrogen phosphate, nitrate, hydrogen carbonate, carbonate, hexafluorosilicate, hexafluorophosphate, benzoate and also the anions of C<sub>1</sub>-C<sub>4</sub>-alkanoic acids, preferably formate, acetate, propionate and butyrate.

40 The organic moieties mentioned for the substituents R<sup>1</sup>-R<sup>12</sup> or as radicals on phenyl and heterocyclyl radicals are collective terms for individual enumerations of the particular group members. All hydrocarbon chains, i.e. all alkyl, haloalkyl, alkoxy, haloalkoxy, alkylthio, haloalkylthio, alkylsulfynyl, 45 haloalkylsulfynyl, alkylsulfonyl, haloalkylsulfonyl, N-alkylaminosulfonyl, N,N-dialkylaminosulfonyl, N-alkylamino, N,N-dialkylamino, N-haloalkylamino, N-alkoxyamino,

N-alkoxy-N-alkylamino, N-alkylcarbonylamino,  
 N-alkylsulfonylamino, N-haloalkylsulfonylamino,  
 N-alkyl-N-alkylsulfonylamino, N-alkyl-N-haloalkylsulfonylamino,  
 alkylcarbonyl, haloalkylcarbonyl, alkoxy carbonyl,  
 5 haloalkoxy carbonyl, alkylthiocarbonyl, alkylcarbonyloxy,  
 alkylaminocarbonyl, dialkylaminocarbonyl,  
 dialkylaminothiocarbonyl, alkoxyalkyl, dialkoxy methyl,  
 dialkylthiomethyl, (alkoxy)(alkylthio)methyl, alkylcarbonylalkyl,  
 alkoxyiminomethyl, alkoxyiminoalkyl, N-(alkylamino)iminoalkyl,  
 10 N-(dialkylamino)iminoalkyl, phenylalkenylcarbonyl,  
 heterocyclalkenylcarbonyl, phenoxyalkylcarbonyl,  
 heterocycloxyalkylcarbonyl, N-alkoxy-N-alkylaminocarbonyl,  
 N-alkyl-N-phenylaminocarbonyl,  
 N-alkyl-N-heterocyclaminocarbonyl, alkoxy carbonyloxy,  
 15 phenylalkyl, heterocyclalkyl, phenylcarbonylalkyl,  
 heterocyclcarbonylalkyl, dialkylaminoalkoxy carbonyl,  
 alkoxyalkoxy carbonyl, alkenylcarbonyl, alkenyloxy carbonyl,  
 alkenylaminocarbonyl, N-alkenyl-N-alkylaminocarbonyl,  
 N-alkenyl-N-alkoxyaminocarbonyl, alkynylcarbonyl,  
 20 alkynylloxy carbonyl, alkynylaminocarbonyl,  
 N-alkynyl-N-alkylaminocarbonyl, N-alkynyl-N-alkoxyaminocarbonyl,  
 alkenyl, alkynyl, haloalkenyl, haloalkynyl, alkenyloxy,  
 alkynylloxy and alkoxyalkoxy moieties, may be straight-chain or  
 branched. Unless indicated otherwise, halogenated substituents  
 25 preferably carry one to five identical or different halogen  
 atoms. The term "halogen" in each case represents fluorine,  
 chlorine, bromine or iodine.

Examples of other meanings are:

30

- C<sub>1</sub>-C<sub>4</sub>-alkyl: for example methyl, ethyl, propyl, 1-methylethyl,  
 butyl, 1-methylpropyl, 2-methylpropyl or 1,1-dimethylethyl;

35 - C<sub>1</sub>-C<sub>6</sub>-alkyl, and the alkyl moieties of  
 C<sub>1</sub>-C<sub>6</sub>-alkoxyimino-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 N-(di-C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-N-(C<sub>1</sub>-C<sub>6</sub>-  
 40 alkyl)-aminocarbonyl,  
 N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl,  
 (C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl,  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-phenylaminocarbonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-  
 heterocyclaminocarbonyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, N-(C<sub>1</sub>-C<sub>6</sub>-  
 alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-  
 45 (C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino, heterocycl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 phenylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl:

$C_1-C_4$ -alkyl as mentioned above, and also, for example, pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1-ethylpropyl, hexyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, 1-methylpentyl, 2-methylpentyl, 5 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,2-dimethylbutyl, 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1-ethyl-1-methylpropyl or 1-ethyl-3-methylpropyl;

10

- $C_1-C_4$ -haloalkyl: a  $C_1-C_4$ -alkyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e., for example, chloromethyl, dichloromethyl, trichloromethyl, fluoromethyl, 15 difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 2-fluoroethyl, 2-chloroethyl, 2-bromoethyl, 2-idoethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoroethyl, 20 2,2,2-trichloroethyl, pentafluoroethyl, 2-fluoropropyl, 3-fluoropropyl, 2,2-difluoropropyl, 2,3-difluoropropyl, 2-chloropropyl, 3-chloropropyl, 2,3-dichloropropyl, 2-bromopropyl, 3-bromopropyl, 3,3,3-trifluoropropyl, 3,3,3-trichloropropyl, 2,2,3,3,3-pentafluoropropyl, 25 heptafluoropropyl, 1-(fluoromethyl)-2-fluoroethyl, 1-(chloromethyl)-2-chloroethyl, 1-(bromomethyl)-2-bromoethyl, 4-fluorobutyl, 4-chlorobutyl, 4-bromobutyl or nonafluorobutyl;
- $C_1-C_6$ -haloalkyl, and the haloalkyl moieties of N- $C_1-C_6$ -haloalkylamino:  $C_1-C_4$ -haloalkyl, as mentioned above, and also, for example, 5-fluoropentyl, 5-chloropentyl, 5-bromopentyl, 5-iodopentyl, undecafluoropentyl, 35 6-fluorohexyl, 6-chlorohexyl, 6-bromohexyl, 6-iodohexyl or dodecafluorohexyl;
- $C_1-C_4$ -alkoxy: for example methoxy, ethoxy, propoxy, 1-methylethoxy, butoxy, 1-methylpropoxy, 2-methylpropoxy or 40 1,1-dimethylethoxy;
- $C_1-C_6$ -alkoxy, and the alkoxy moieties of N- $C_1-C_6$ -alkoxyamino, di-( $C_1-C_6$ -alkoxy)methyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)(C<sub>1</sub>-C<sub>6</sub>-alkylthio)-methyl, 45 C<sub>1</sub>-C<sub>6</sub>-alkoxyiminomethyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyimino-C<sub>1</sub>-C<sub>6</sub>-alkyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl and

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N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl: C<sub>1</sub>-C<sub>4</sub>-alkoxy as mentioned above, and also, for example, pentoxy,

1-methylbutoxy, 2-methylbutoxy, 3-methylbutoxy,  
1,1-dimethylpropoxy, 1,2-dimethylpropoxy,

5 2,2-dimethylpropoxy, 1-ethylpropoxy, hexoxy, 1-methylpentoxy,  
2-methylpentoxy, 3-methylpentoxy, 4-methylpentoxy,  
1,1-dimethylbutoxy, 1,2-dimethylbutoxy, 1,3-dimethylbutoxy,  
2,2-dimethylbutoxy, 2,3-dimethylbutoxy, 3,3-dimethylbutoxy,  
1-ethylbutoxy, 2-ethylbutoxy, 1,1,2-trimethylpropoxy,

10 1,2,2-trimethylpropoxy, 1-ethyl-1-methylpropoxy or  
1-ethyl-2-methylpropoxy;

— C<sub>1</sub>-C<sub>4</sub>-haloalkoxy: a C<sub>1</sub>-C<sub>4</sub>-alkoxy radical as mentioned above which is partially or fully substituted by fluorine,

15 chlorine, bromine and/or iodine, i.e., for example, fluoromethoxy, difluoromethoxy, trifluoromethoxy, chlorodifluoromethoxy, bromodifluoromethoxy, 2-fluoroethoxy, 2-chloroethoxy, 2-bromomethoxy, 2-iodoethoxy,

20 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2-chloro-2-fluoroethoxy, 2-chloro-2,2-difluoroethoxy,

2,2-dichloro-2-fluoroethoxy, 2,2,2-trichloroethoxy, pentafluoroethoxy, 2-fluoropropoxy, 3-fluoropropoxy,

2-chloropropoxy, 3-chloropropoxy, 2-bromopropoxy,

3-bromopropoxy, 2,2-difluoropropoxy, 2,3-difluoropropoxy,

2,3-dichloropropoxy, 3,3,3-trifluoropropoxy,

3,3,3-trichloropropoxy, 2,2,3,3,3-pentafluoropropoxy,

heptafluoropropoxy, 1-(fluoromethyl)-2-fluoroethoxy,

1-(chloromethyl)-2-chloroethoxy,

1-(bromomethyl)-2-bromoethoxy, 4-fluorobutoxy,

30 4-chlorobutoxy, 4-bromobutoxy or nonafluorobutoxy;

— C<sub>1</sub>-C<sub>6</sub>-haloalkoxy: C<sub>1</sub>-C<sub>4</sub>-haloalkoxy as mentioned above, and also, for example, 5-fluoropentoxy, 5-chloropentoxy,

35 5-bromopentoxy, 5-iodopentoxy, undecafluoropentoxy, 6-fluorohexoxy, 6-chlorohexoxy, 6-bromohexoxy, 6-iodohexoxy or dodecafluorohexoxy;

— C<sub>1</sub>-C<sub>4</sub>-alkylthio: for example methylthio, ethylthio, propylthio, 1-methylethylthio, butylthio, 1-methylpropylthio, 2-methylpropylthio or 1,1-dimethylethylthio;

40 — C<sub>1</sub>-C<sub>6</sub>-alkylthio, and the alkylthio moieties of (C<sub>1</sub>-C<sub>6</sub>-alkylthio)carbonyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl and (C<sub>1</sub>-C<sub>6</sub>-alkoxy)-(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl: C<sub>1</sub>-C<sub>4</sub>-alkylthio as mentioned above, and also, for example, pentylthio, 1-methylbutylthio, 2-methylbutylthio, 3-methylbutylthio,

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2,2-dimethylpropylthio, 1-ethylpropylthio, hexylthio,  
 1,1-dimethylpropylthio, 1,2-dimethylpropylthio,  
 1-methylpentylthio, 2-methylpentylthio, 3-methylpentylthio,  
 4-methylpentylthio, 1,1-dimethylbutylthio,  
 5 1,2-dimethylbutylthio, 1,3-dimethylbutylthio,  
 2,2-dimethylbutylthio, 2,3-dimethylbutylthio,  
 3,3-dimethylbutylthio, 1-ethylbutylthio, 2-ethylbutylthio,  
 1,1,2-trimethylpropylthio, 1,2,2-trimethylpropylthio,  
 1-ethyl-1-methylpropylthio or 1-ethyl-2-methylpropylthio;

10 -  $C_1-C_{20}$ -alkylthio as alkylthio radical of  
 ( $C_1-C_{20}$ -alkylthio)carbonyl:  $C_1-C_6$ -alkylthio as mentioned  
 above, and also, for example, heptylthio, octylthio,  
 hexadecylthio or octadecylthio;

15 -  $C_1-C_4$ -haloalkylthio: a  $C_1-C_4$ -alkylthio radical as mentioned  
 above which is partially or fully substituted by fluorine,  
 chlorine, bromine and/or iodine, i.e., for example,  
 20 fluoromethylthio, difluoromethylthio, trifluoromethylthio,  
 chlorodifluoromethylthio, bromodifluoromethylthio,  
 2-fluoroethylthio, 2-chloroethylthio, 2-bromoethylthio,  
 2-iodoethylthio, 2,2-difluoroethylthio,  
 2,2,2-trifluoroethylthio, 2,2,2-trichloroethylthio,  
 2-chloro-2-fluoroethylthio, 2-chloro-2,2-difluoroethylthio,  
 25 2,2-dichloro-2-fluoroethylthio, pentafluoroethylthio,  
 2-fluoropropylthio, 3-fluoropropylthio, 2-chloropropylthio,  
 3-chloropropylthio, 2-bromopropylthio, 3-bromopropylthio,  
 2,2-difluoropropylthio, 2,3-difluoropropylthio,  
 2,3-dichloropropylthio, 3,3,3-trifluoropropylthio,  
 30 3,3,3-trichloropropylthio, 2,2,3,3,3-pentafluoropropylthio,  
 heptafluoropropylthio, 1-(fluoromethyl)-2-fluoroethylthio,  
 1-(chloromethyl)-2-chloroethylthio,  
 1-(bromomethyl)-2-bromoethylthio, 4-fluorobutylthio,  
 4-chlorobutylthio, 4-bromobutylthio or nonafluorobutylthio;

35 -  $C_1-C_6$ -haloalkylthio:  $C_1-C_4$ -haloalkylthio, as mentioned above,  
 and also, for example, 5-fluoropentylthio,  
 5-chloropentylthio, 5-bromopentylthio, 5-iodopentylthio,  
 40 undecafluoropentylthio, 6-fluorohexylthio, 6-chlorohexylthio,  
 6-bromohexylthio, 6-iodohexylthio or dodecafluorohexylthio;

45 -  $C_1-C_6$ -alkylsulfinyl ( $C_1-C_6$ -alkyl-S(=O)-): for example  
 methylsulfinyl, ethylsulfinyl, propylsulfinyl,  
 1-methylethylsulfinyl, butylsulfinyl, 1-methylpropylsulfinyl,  
 2-methylpropylsulfinyl, 1,1-dimethylethylsulfinyl,  
 pentylsulfinyl, 1-methylbutylsulfinyl, 2-methylbutylsulfinyl,

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3-methylbutylsulfinyl, 2,2-dimethylpropylsulfinyl,  
 1-ethylpropylsulfinyl, 1,1-dimethylpropylsulfinyl,  
 1,2-dimethylpropylsulfinyl, hexylsulfinyl,  
 1-methylpentylsulfinyl, 2-methylpentylsulfinyl,  
 5 3-methylpentylsulfinyl, 4-methylpentylsulfinyl,  
 1,1-dimethylbutylsulfinyl, 1,2-dimethylbutylsulfinyl,  
 1,3-dimethylbutylsulfinyl, 2,2-dimethylbutylsulfinyl,  
 2,3-dimethylbutylsulfinyl, 3,3-dimethylbutylsulfinyl,  
 1-ethylbutylsulfinyl, 2-ethylbutylsulfinyl,  
 10 1,1,2-trimethylpropylsulfinyl, 1,2,2-trimethylpropylsulfinyl,  
 1-ethyl-1-methylpropylsulfinyl or  
 1-ethyl-2-methylpropylsulfinyl;

15 -  $C_1-C_6$ -haloalkylsulfinyl: a  $C_1-C_6$ -alkylsulfinyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e., for example, fluoromethylsulfinyl, difluoromethylsulfinyl, trifluoromethylsulfinyl, chlorodifluoromethylsulfinyl, bromodifluoromethylsulfinyl, 2-fluoroethylsulfinyl,  
 20 2-chloroethylsulfinyl, 2-bromoethylsulfinyl, 2-iodoethylsulfinyl, 2,2-difluoroethylsulfinyl, 2,2,2-trifluoroethylsulfinyl, 2,2,2-trichloroethylsulfinyl, 2-chloro-2-fluoroethylsulfinyl, 2-chloro-2,2-difluoroethylsulfinyl,  
 25 2,2-dichloro-2-fluoroethylsulfinyl, pentafluoroethylsulfinyl, 2-fluoropropylsulfinyl, 3-fluoropropylsulfinyl, 2-chloropropylsulfinyl, 3-chloropropylsulfinyl, 2-bromopropylsulfinyl, 3-bromopropylsulfinyl, 2,2-difluoropropylsulfinyl, 2,3-difluoropropylsulfinyl,  
 30 30 2,3-dichloropropylsulfinyl, 3,3,3-trifluoropropylsulfinyl, 3,3,3-trichloropropylsulfinyl, 2,2,3,3,3-pentafluoropropylsulfinyl, heptafluoropropylsulfinyl, 1-(fluoromethyl)-2-fluoroethylsulfinyl, 1-(chloromethyl)-2-chloroethylsulfinyl,  
 35 1-(bromomethyl)-2-bromoethylsulfinyl, 4-fluorobutylsulfinyl, 4-chlorobutylsulfinyl, 4-bromobutylsulfinyl, nonafluorobutylsulfinyl, 5-fluoropentylsulfinyl, 5-chloropentylsulfinyl, 5-bromopentylsulfinyl,  
 40 40 5-iodopentylsulfinyl, undecafluoropentylsulfinyl, 6-fluorohexylsulfinyl, 6-chlorohexylsulfinyl, 6-bromohexylsulfinyl, 6-iodohexylsulfinyl or dodecafluorohexylsulfinyl;

45 -  $C_1-C_6$ -alkylsulfonyl ( $C_1-C_6$ -alkyl-S(=O)<sub>2</sub>-), and the alkylsulfonyl radicals of N-( $C_1-C_6$ -alkylsulfonyl)amino and N-( $C_1-C_6$ -alkyl)-N-( $C_1-C_6$ -alkylsulfonyl)amino: for example,

methylsulfonyl, ethylsulfonyl, propylsulfonyl,  
 1-methylethylsulfonyl, butylsulfonyl, 1-methylpropylsulfonyl,  
 2-methylpropylsulfonyl, 1,1-dimethylethylsulfonyl,  
 pentylsulfonyl, 1-methylbutylsulfonyl, 2-methylbutylsulfonyl,  
 5 3-methylbutylsulfonyl, 1,1-dimethylpropylsulfonyl,  
 1,2-dimethylpropylsulfonyl, 2,2-dimethylpropylsulfonyl,  
 1-ethylpropylsulfonyl, hexylsulfonyl, 1-methylpentylsulfonyl,  
 2-methylpentylsulfonyl, 3-methylpentylsulfonyl,  
 4-methylpentylsulfonyl, 1,1-dimethylbutylsulfonyl,  
 10 1,2-dimethylbutylsulfonyl, 1,3-dimethylbutylsulfonyl,  
 2,2-dimethylbutylsulfonyl, 2,3-dimethylbutylsulfonyl,  
 3,3-dimethylbutylsulfonyl, 1-ethylbutylsulfonyl,  
 2-ethylbutylsulfonyl, 1,1,2-trimethylpropylsulfonyl,  
 1,2,2-trimethylpropylsulfonyl, 1-ethyl-1-methylpropylsulfonyl  
 15 or 1-ethyl-2-methylpropylsulfonyl;  
  
 — C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, and the haloalkylsulfonyl radicals of  
 N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino and  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino: a  
 20 C<sub>1</sub>-alkylsulfonyl radical as mentioned above which is  
 partially or fully substituted by fluorine, chlorine, bromine  
 and/or iodine, i.e., for example, fluoromethylsulfonyl,  
 difluoromethylsulfonyl, trifluoromethylsulfonyl,  
 chlorodifluoromethylsulfonyl, bromodifluoromethylsulfonyl,  
 25 2-fluoroethylsulfonyl, 2-chloroethylsulfonyl,  
 2-bromoethylsulfonyl, 2-iodoethylsulfonyl,  
 2,2-difluoroethylsulfonyl, 2,2,2-trifluoroethylsulfonyl,  
 2-chloro-2-fluoroethylsulfonyl,  
 2-chloro-2,2-difluoroethylsulfonyl,  
 30 2,2-dichloro-2-fluoroethylsulfonyl,  
 2,2,2-trichloroethylsulfonyl, pentafluoroethylsulfonyl,  
 2-fluoropropylsulfonyl, 3-fluoropropylsulfonyl,  
 2-chloropropylsulfonyl, 3-chloropropylsulfonyl,  
 2-bromopropylsulfonyl, 3-bromopropylsulfonyl,  
 35 2,2-difluoropropylsulfonyl, 2,3-difluoropropylsulfonyl,  
 2,3-dichloropropylsulfonyl, 3,3,3-trifluoropropylsulfonyl,  
 3,3,3-trichloropropylsulfonyl,  
 2,2,3,3,3-pentafluoropropylsulfonyl,  
 heptafluoropropylsulfonyl,  
 40 1-(fluoromethyl)-2-fluoroethylsulfonyl,  
 1-(chloromethyl)-2-chloroethylsulfonyl,  
 1-(bromomethyl)-2-bromoethylsulfonyl, 4-fluorobutylsulfonyl,  
 4-chlorobutylsulfonyl, 4-bromobutylsulfonyl,  
 nonafluorobutylsulfonyl, 5-fluoropentylsulfonyl,  
 45 5-chloropentylsulfonyl, 5-bromopentylsulfonyl,  
 5-iodopentylsulfonyl, 6-fluorohexylsulfonyl,

6-bromohexylsulfonyl, 6-iodohexylsulfonyl or  
dodecafluorohexylsulfonyl;

- 5 -  $C_1-C_6$ -alkylamino, and the alkylamino radicals of  
 $N-(C_1-C_6\text{-alkylamino})\text{imino-}C_1-C_6\text{-alkyl}$ : for example  
 methylamino, ethylamino, propylamino, 1-methylethylamino,  
 butylamino, 1-methylpropylamino, 2-methylpropylamino,  
 1,1-dimethylethylamino, pentylamino, 1-methylbutylamino,  
 2-methylbutylamino, 3-methylbutylamino,  
 10 2,2-dimethylpropylamino, 1-ethylpropylamino, hexylamino,  
 1,1-dimethylpropylamino, 1,2-dimethylpropylamino,  
 1-methylpentylamino, 2-methylpentylamino,  
 3-methylpentylamino, 4-methylpentylamino,  
 1,1-dimethylbutylamino, 1,2-dimethylbutylamino,  
 15 1,3-dimethylbutylamino, 2,2-dimethylbutylamino,  
 2,3-dimethylbutylamino, 3,3-dimethylbutylamino,  
 1-ethylbutylamino, 2-ethylbutylamino,  
 1,1,2-trimethylpropylamino, 1,2,2-trimethylpropylamino,  
 20 1-ethyl-1-methylpropylamino or 1-ethyl-2-methylpropylamino;
- 20 -  $(C_1-C_4\text{-alkylamino})\text{sulfonyl}$ : for example methylaminosulfonyl,  
 ethylaminosulfonyl, propylaminosulfonyl,  
 1-methylethylaminosulfonyl, butylaminosulfonyl,  
 25 1-methylpropylaminosulfonyl, 2-methylpropylaminosulfonyl or  
 1,1-dimethylethylaminosulfonyl;
- 25 -  $(C_1-C_6\text{-alkylamino})\text{sulfonyl}$ :  $(C_1-C_4\text{-alkylamino})\text{sulfonyl}$ , as  
 mentioned above, and also, for example, pentylaminosulfonyl,  
 1-methylbutylaminosulfonyl, 2-methylbutylaminosulfonyl,  
 30 3-methylbutylaminosulfonyl, 2,2-dimethylpropylaminosulfonyl,  
 1-ethylpropylaminosulfonyl, hexylaminosulfonyl,  
 1,1-dimethylpropylaminosulfonyl,  
 1,2-dimethylpropylaminosulfonyl, 1-methylpentylaminosulfonyl,  
 35 2-methylpentylaminosulfonyl, 3-methylpentylaminosulfonyl,  
 4-methylpentylaminosulfonyl, 1,1-dimethylbutylaminosulfonyl,  
 1,2-dimethylbutylaminosulfonyl,  
 1,3-dimethylbutylaminosulfonyl,  
 2,2-dimethylbutylaminosulfonyl,  
 40 2,3-dimethylbutylaminosulfonyl,  
 3,3-dimethylbutylaminosulfonyl, 1-ethylbutylaminosulfonyl,  
 2-ethylbutylaminosulfonyl,  
 1,1,2-trimethylpropylaminosulfonyl,  
 1,2,2-trimethylpropylaminosulfonyl,  
 45 1-ethyl-1-methylpropylaminosulfonyl or  
 1-ethyl-2-methylpropylaminosulfonyl;

- di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminosulfonyl: for example  
 N,N-dimethylaminosulfonyl, N,N-diethylaminosulfonyl,  
 N,N-di-(1-methylethyl)aminosulfonyl,  
 N,N-dipropylaminosulfonyl, N,N-dibutylaminosulfonyl,  
 5 N,N-di-(1-methylpropyl)aminosulfonyl,  
 N,N-di-(2-methylpropyl)aminosulfonyl,  
 N,N-di-(1,1-dimethylethyl)aminosulfonyl,  
 N-ethyl-N-methylaminosulfonyl,  
 N-methyl-N-propylaminosulfonyl,  
 10 N-methyl-N-(1-methylethyl)aminosulfonyl,  
 N-butyl-N-methylaminosulfonyl,  
 N-methyl-N-(1-methylpropyl)aminosulfonyl,  
 N-methyl-N-(2-methylpropyl)aminosulfonyl,  
 N-(1,1-dimethylethyl)-N-methylaminosulfonyl,  
 15 N-ethyl-N-propylaminosulfonyl,  
 N-ethyl-N-(1-methylethyl)aminosulfonyl,  
 N-butyl-N-ethylaminosulfonyl,  
 N-ethyl-N-(1-methylpropyl)aminosulfonyl,  
 N-ethyl-N-(2-methylpropyl)aminosulfonyl,  
 20 N-ethyl-N-(1,1-dimethylethyl)aminosulfonyl,  
 N-(1-methylethyl)-N-propylaminosulfonyl,  
 N-butyl-N-propylaminosulfonyl,  
 N-(1-methylpropyl)-N-propylaminosulfonyl,  
 N-(2-methylpropyl)-N-propylaminosulfonyl,  
 25 N-(1,1-dimethylethyl)-N-propylaminosulfonyl, N-butyl-N-(1-methylethyl)aminosulfonyl,  
 N-(1-methylethyl)-N-(1-methylpropyl)aminosulfonyl,  
 N-(1-methylethyl)-N-(2-methylpropyl)aminosulfonyl,  
 N-(1,1-dimethylethyl)-N-(1-methylethyl)aminosulfonyl,  
 30 N-butyl-N-(1-methylpropyl)aminosulfonyl,  
 N-butyl-N-(2-methylpropyl)aminosulfonyl,  
 N-butyl-N-(1,1-dimethylethyl)aminosulfonyl,  
 N-(1-methylpropyl)-N-(2-methylpropyl)aminosulfonyl,  
 N-(1,1-dimethylethyl)-N-(1-methylpropyl)aminosulfonyl or  
 35 N-(1,1-dimethylethyl)-N-(2-methylpropyl)aminosulfonyl;  
  
- di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminosulfonyl: di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminosulfonyl,  
 as mentioned above, and also, for example,  
 N-methyl-N-pentylaminosulfonyl,  
 40 N-methyl-N-(1-methylbutyl)aminosulfonyl,  
 N-methyl-N-(2-methylbutyl)aminosulfonyl,  
 N-methyl-N-(3-methylbutyl)aminosulfonyl, N-methyl-N-(2,2-dimethylpropyl)aminosulfonyl,  
 N-methyl-N-(1-ethylpropyl)aminosulfonyl,  
 45 N-methyl-N-hexylaminosulfonyl,  
 N-methyl-N-(1,1-dimethylpropyl)aminosulfonyl, N-methyl-N-(1,2-dimethylpropyl)aminosulfonyl,

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N-methyl-N-(1-methylpentyl)aminosulfonyl,  
 N-methyl-N-(2-methylpentyl)aminosulfonyl,  
 N-methyl-N-(3-methylpentyl)aminosulfonyl,  
 N-methyl-N-(4-methylpentyl)aminosulfonyl, N-methyl-N-  
 5 (1,1-dimethylbutyl)aminosulfonyl,  
 N-methyl-N-(1,2-dimethylbutyl)aminosulfonyl,  
 N-methyl-N-(1,3-dimethylbutyl)aminosulfonyl,  
 N-methyl-N-(2,2-dimethylbutyl)aminosulfonyl,  
 N-methyl-N-(2,3-dimethylbutyl)aminosulfonyl, N-methyl-N-  
 10 (3,3-dimethylbutyl)aminosulfonyl,  
 N-methyl-N-(1-ethylbutyl)aminosulfonyl,  
 N-methyl-N-(2-ethylbutyl)aminosulfonyl,  
 N-methyl-N-(1,1,2-trimethylpropyl)aminosulfonyl,  
 N-methyl-N-(1,2,2-trimethylpropyl)aminosulfonyl,  
 15 N-methyl-N-(1-ethyl-1-methylpropyl)aminosulfonyl, N-methyl-N-(1-ethyl-2-methylpropyl)aminosulfonyl,  
 N-ethyl-N-pentylaminosulfonyl,  
 N-ethyl-N-(1-methylbutyl)aminosulfonyl,  
 N-ethyl-N-(2-methylbutyl)aminosulfonyl,  
 20 N-ethyl-N-(3-methylbutyl)aminosulfonyl,  
 N-ethyl-N-(2,2-dimethylpropyl)aminosulfonyl,  
 N-ethyl-N-(1-ethylpropyl)aminosulfonyl,  
 N-ethyl-N-hexylaminosulfonyl,  
 N-ethyl-N-(1,1-dimethylpropyl)aminosulfonyl,  
 25 N-ethyl-N-(1,2-dimethylpropyl)aminosulfonyl,  
 N-ethyl-N-(1-methylpentyl)aminosulfonyl,  
 N-ethyl-N-(2-methylpentyl)aminosulfonyl,  
 N-ethyl-N-(3-methylpentyl)aminosulfonyl,  
 N-ethyl-N-(4-methylpentyl)aminosulfonyl,  
 30 N-ethyl-N-(1,1-dimethylbutyl)aminosulfonyl,  
 N-ethyl-N-(1,2-dimethylbutyl)aminosulfonyl,  
 N-ethyl-N-(1,3-dimethylbutyl)aminosulfonyl,  
 N-ethyl-N-(2,2-dimethylbutyl)aminosulfonyl,  
 N-ethyl-N-(2,3-dimethylbutyl)aminosulfonyl,  
 35 N-ethyl-N-(3,3-dimethylbutyl)aminosulfonyl,  
 N-ethyl-N-(1-ethylbutyl)aminosulfonyl,  
 N-ethyl-N-(2-ethylbutyl)aminosulfonyl,  
 N-ethyl-N-(1,1,2-trimethylpropyl)aminosulfonyl,  
 N-ethyl-N-(1,2,2-trimethylpropyl)aminosulfonyl,  
 40 N-ethyl-N-(1-ethyl-1-methylpropyl)aminosulfonyl,  
 N-ethyl-N-(1-ethyl-2-methylpropyl)aminosulfonyl,  
 N-propyl-N-pentylaminosulfonyl,  
 N-butyl-N-pentylaminosulfonyl, N,N-dipentylaminosulfonyl,  
 N-propyl-N-hexylaminosulfonyl, N-butyl-N-hexylaminosulfonyl,  
 45 N-pentyl-N-hexylaminosulfonyl or N,N-dihexylaminosulfonyl;

- di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino and the dialkylamino radicals of:  
di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl and  
N-(di-C<sub>1</sub>-C<sub>4</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl for example  
N,N-dimethylamino, N,N-diethylamino, N,N-dipropylamino,  
5 N,N-di-(1-methylethyl)amino, N,N-dibutylamino,  
N,N-di-(1-methylpropyl)amino, N,N-di-(2-methylpropyl)amino,  
N,N-di-(1,1-dimethylethyl)amino, N-ethyl-N-methylamino,  
N-methyl-N-propylamino, N-methyl-N-(1-methylethyl)amino,  
N-butyl-N-methylamino, N-methyl-N-(1-methylpropyl)amino,  
10 N-methyl-N-(2-methylpropyl)amino,  
N-(1,1-dimethylethyl)-N-methylamino, N-ethyl-N-propylamino,  
N-ethyl-N-(1-methylethyl)amino, N-butyl-N-ethylamino,  
N-ethyl-N-(1-methylpropyl)amino,  
N-ethyl-N-(2-methylpropyl)amino,  
15 N-ethyl-N-(1,1-dimethylethyl)amino,  
N-(1-methylethyl)-N-propylamino, N-butyl-N-propylamino,  
N-(1-methylpropyl)-N-propylamino,  
N-(2-methylpropyl)-N-propylamino,  
N-(1,1-dimethylethyl)-N-propylamino,  
20 N-butyl-N-(1-methylethyl)amino,  
N-(1-methylethyl)-N-(1-methylpropyl)amino,  
N-(1-methylethyl)-N-(2-methylpropyl)amino,  
N-(1,1-dimethylethyl)-N-(1-methylethyl)amino,  
N-butyl-N-(1-methylpropyl)amino,  
25 N-butyl-N-(2-methylpropyl)amino,  
N-butyl-N-(1,1-dimethylethyl)amino,  
N-(1-methylpropyl)-N-(2-methylpropyl)amino,  
N-(1,1-dimethylethyl)-N-(1-methylpropyl)amino or  
N-(1,1-dimethylethyl)-N-(2-methylpropyl)amino;  
30
  - di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino, and the dialkylamino radicals of  
di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino-imino-C<sub>1</sub>-C<sub>6</sub>-alkyl: di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino  
as mentioned above, and also N,N-dipentylamino,  
N,N-dihexylamino, N-methyl-N-pentylamino,  
35 N-ethyl-N-pentylamino, N-methyl-N-hexylamino or  
N-ethyl-N-hexylamino;
  - C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl: for example methylcarbonyl,  
40 ethylcarbonyl, propylcarbonyl, 1-methylethylcarbonyl,  
butylcarbonyl, 1-methylpropylcarbonyl, 2-methylpropylcarbonyl  
or 1,1-dimethylethylcarbonyl;
  - C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, and the alkylcarbonyl radicals of  
45 phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
heterocyclyloxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonylamino,  
C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, as

mentioned above, and also, for example, pentylcarbonyl, 1-methylbutylcarbonyl, 2-methylbutylcarbonyl, 3-methylbutylcarbonyl, 2,2-dimethylpropylcarbonyl, 1-ethylpropylcarbonyl, hexylcarbonyl,

5 1,1-dimethylpropylcarbonyl, 1,2-dimethylpropylcarbonyl, 1-methylpentylcarbonyl, 2-methylpentylcarbonyl, 3-methylpentylcarbonyl, 4-methylpentylcarbonyl, 1,1-dimethylbutylcarbonyl, 1,2-dimethylbutylcarbonyl, 1,3-dimethylbutylcarbonyl, 2,2-dimethylbutylcarbonyl,

10 2,3-dimethylbutylcarbonyl, 3,3-dimethylbutylcarbonyl, 1-ethylbutylcarbonyl, 2-ethylbutylcarbonyl, 1,1,2-trimethylpropylcarbonyl, 1,2,2-trimethylpropylcarbonyl, 1-ethyl-1-methylpropylcarbonyl or 1-ethyl-2-methylpropylcarbonyl;

15

- C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl: C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, as mentioned above, and also heptylcarbonyl, octylcarbonyl, pentadecylcarbonyl or heptadecylcarbonyl;

20 20 - C<sub>1</sub>-C<sub>6</sub>-haloalkylcarbonyl: a C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e., for example, chloroacetyl, dichloroacetyl, trichloroacetyl, fluoroacetyl, difluoroacetyl, trifluoroacetyl, chlorofluoroacetyl, dichlorofluoroacetyl, chlorodifluoroacetyl, 2-fluoroethylcarbonyl, 2-chloroethylcarbonyl, 2-bromoethylcarbonyl, 2-iodoethylcarbonyl, 2,2-difluoroethylcarbonyl, 2,2,2-trifluoroethylcarbonyl,

25 25 - 2-chloro-2-fluoroethylcarbonyl, 2-chloro-2,2-difluoroethylcarbonyl, 2,2-dichloro-2-fluoroethylcarbonyl, 2,2,2-trichloroethylcarbonyl, pentafluoroethylcarbonyl, 2-fluoropropylcarbonyl, 3-fluoropropylcarbonyl, 2,2-difluoropropylcarbonyl, 2,3-difluoropropylcarbonyl,

30 30 - 2-chloropropylcarbonyl, 3-chloropropylcarbonyl, 2,3-dichloropropylcarbonyl, 2-bromopropylcarbonyl, 3-bromopropylcarbonyl, 3,3,3-trifluoropropylcarbonyl, 3,3,3-trichloropropylcarbonyl, 2,2,3,3,3-pentafluoropropylcarbonyl,

35 35 - heptafluoropropylcarbonyl, 1-(fluoromethyl)-2-fluoroethylcarbonyl, 1-(chloromethyl)-2-chloroethylcarbonyl, 1-(bromomethyl)-2-bromoethylcarbonyl, 4-fluorobutylcarbonyl, 4-chlorobutylcarbonyl, 4-bromobutylcarbonyl,

40 40 - nonafluorobutylcarbonyl, 5-fluoropentylcarbonyl, 5-chloropentylcarbonyl, 5-bromopentylcarbonyl, Perfluoropentylcarbonyl, 6-fluorohexylcarbonyl,

6-chlorohexylcarbonyl, 6-bromohexylcarbonyl or  
Perfluorohexylcarbonyl;

- 5 -  $C_1-C_4$ -alkoxycarbonyl, and the alkoxycarbonyl moieties of  
di- $(C_1-C_4$ -alkyl)amino- $C_1-C_4$ -alkoxycarbonyl, for example  
methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl,  
1-methylethoxycarbonyl, butoxycarbonyl,  
1-methylpropoxycarbonyl, 2-methylpropoxycarbonyl or  
1,1-dimethylethoxycarbonyl;
- 10 -  $(C_1-C_6$ -alkoxy)carbonyl, and the alkoxycarbonyl moieties of  
 $C_1-C_6$ -alkoxycarbonyloxy:  $(C_1-C_4$ -alkoxy)carbonyl, as mentioned  
above, and also, for example, pentoxy carbonyl,  
15 1-methylbutoxycarbonyl, 2-methylbutoxycarbonyl,  
3-methylbutoxycarbonyl, 2,2-dimethylpropoxycarbonyl,  
1-ethylpropoxycarbonyl, hexoxycarbonyl,  
1,1-dimethylpropoxycarbonyl, 1,2-dimethylpropoxycarbonyl,  
20 1-methylpentoxy carbonyl, 2-methylpentoxy carbonyl,  
3-methylpentoxy carbonyl, 4-methylpentoxy carbonyl,  
1,1-dimethylbutoxycarbonyl, 1,2-dimethylbutoxycarbonyl,  
1,3-dimethylbutoxycarbonyl, 2,2-dimethylbutoxycarbonyl,  
25 2,3-dimethylbutoxycarbonyl, 3,3-dimethylbutoxycarbonyl,  
1-ethylbutoxycarbonyl, 2-ethylbutoxycarbonyl,  
1,1,2-trimethylpropoxycarbonyl,  
1,2,2-trimethylpropoxycarbonyl,  
1-ethyl-1-methylpropoxycarbonyl or  
1-ethyl-2-methylpropoxycarbonyl;
- 30 -  $C_1-C_6$ -haloalkoxycarbonyl: a  $C_1-C_6$ -alkoxycarbonyl radical as  
mentioned above which is partially or fully substituted by  
fluorine, chlorine, bromine and/or iodine, i.e., for example,  
fluoromethoxycarbonyl, difluoromethoxycarbonyl,  
trifluoromethoxycarbonyl, chlorodifluoromethoxycarbonyl,  
35 bromodifluoromethoxycarbonyl, 2-fluoroethoxycarbonyl,  
2-chloroethoxycarbonyl, 2-bromoethoxycarbonyl,  
2-iodoethoxycarbonyl, 2,2-difluoroethoxycarbonyl,  
2,2,2-trifluoroethoxycarbonyl, 2-chloro-  
2-fluoroethoxycarbonyl, 2-chloro-2,2-difluoroethoxycarbonyl,  
40 2,2-dichloro-2-fluoroethoxycarbonyl,  
2,2,2-trichloroethoxycarbonyl, pentafluoroethoxycarbonyl,  
2-fluoropropoxycarbonyl, 3-fluoropropoxycarbonyl,  
2-chloropropoxycarbonyl, 3-chloropropoxycarbonyl,  
2-bromopropoxycarbonyl, 3-bromopropoxycarbonyl,  
45 2,2-difluoropropoxycarbonyl, 2,3-difluoropropoxycarbonyl,  
2,3-dichloropropoxycarbonyl, 3,3,3-trifluoropropoxycarbonyl,  
3,3,3-trichloropropoxycarbonyl,

2,2,3,3,3-pentafluoropropoxycarbonyl,  
 heptafluoropropoxycarbonyl,  
 1-(fluoromethyl)-2-fluoroethoxycarbonyl,  
 1-(chloromethyl)-2-chloroethoxycarbonyl,  
 5 1-(bromomethyl)-2-bromethoxycarbonyl, 4-fluorobutoxycarbonyl,  
 4-chlorobutoxycarbonyl, 4-bromobutoxycarbonyl,  
 4-iodobutoxycarbonyl, 5-fluoropentoxy carbonyl,  
 5-chloropentoxy carbonyl, 5-bromopentoxy carbonyl,  
 6-fluorohexoxycarbonyl, 6-chlorohexoxycarbonyl or  
 10 6-bromohexoxycarbonyl;

— (C<sub>1</sub>—C<sub>4</sub>—alkyl)carbonyloxy: acetyloxy, ethylcarbonyloxy,  
 propylcarbonyloxy, 1-methylethylcarbonyloxy,  
 butylcarbonyloxy, 1-methylpropylcarbonyloxy,  
 15 2-methylpropylcarbonyloxy or 1,1-dimethylethylcarbonyloxy;

— (C<sub>1</sub>—C<sub>4</sub>—alkylamino)carbonyl: for example methylaminocarbonyl,  
 ethylaminocarbonyl, propylaminocarbonyl,  
 20 1-methylethylaminocarbonyl, butylaminocarbonyl,  
 1-methylpropylaminocarbonyl, 2-methylpropylaminocarbonyl or  
 1,1-dimethylethylaminocarbonyl;

— (C<sub>1</sub>—C<sub>6</sub>—alkylamino)carbonyl: (C<sub>1</sub>—C<sub>4</sub>—alkylamino)carbonyl, as  
 25 mentioned above, and also, for example, pentylaminocarbonyl,  
 1-methylbutylaminocarbonyl, 2-methylbutylaminocarbonyl,  
 3-methylbutylaminocarbonyl, 2,2-dimethylpropylaminocarbonyl,  
 1-ethylpropylaminocarbonyl, hexylaminocarbonyl,  
 1,1-dimethylpropylaminocarbonyl,  
 30 1,2-dimethylpropylaminocarbonyl, 1-methylpentylaminocarbonyl,  
 2-methylpentylaminocarbonyl, 3-methylpentylaminocarbonyl,  
 4-methylpentylaminocarbonyl, 1,1-dimethylbutylaminocarbonyl,  
 1,2-dimethylbutylaminocarbonyl,  
 1,3-dimethylbutylaminocarbonyl,  
 35 2,2-dimethylbutylaminocarbonyl,  
 2,3-dimethylbutylaminocarbonyl,  
 3,3-dimethylbutylaminocarbonyl, 1-ethylbutylaminocarbonyl,  
 2-ethylbutylaminocarbonyl,  
 1,1,2-trimethylpropylaminocarbonyl,  
 40 1,2,2-trimethylpropylaminocarbonyl,  
 1-ethyl-1-methylpropylaminocarbonyl or  
 1-ethyl-2-methylpropylaminocarbonyl;

— di-(C<sub>1</sub>—C<sub>4</sub>—alkyl)aminocarbonyl: for example  
 45 N,N-dimethylaminocarbonyl, N,N-diethylaminocarbonyl,  
 N,N-di-(1-methylethyl)aminocarbonyl,  
 N,N-dipropylaminocarbonyl, N,N-dibutylaminocarbonyl,

N,N-di-(1-methylpropyl)aminocarbonyl,  
 N,N-di-(2-methylpropyl)aminocarbonyl,  
 N,N-di-(1,1-dimethylethyl)aminocarbonyl,  
 N-ethyl-N-methylaminocarbonyl,  
 5 N-methyl-N-propylaminocarbonyl,  
 N-methyl-N-(1-methylethyl)aminocarbonyl,  
 N-butyl-N-methylaminocarbonyl,  
 N-methyl-N-(1-methylpropyl)aminocarbonyl,  
 N-methyl-N-(2-methylpropyl)aminocarbonyl,  
 10 N-(1,1-dimethylethyl)-N-methylaminocarbonyl,  
 N-ethyl-N-propylaminocarbonyl,  
 N-ethyl-N-(1-methylethyl)aminocarbonyl,  
 N-butyl-N-ethylaminocarbonyl,  
 N-ethyl-N-(1-methylpropyl)aminocarbonyl,  
 15 N-ethyl-N-(2-methylpropyl)aminocarbonyl,  
 N-ethyl-N-(1,1-dimethylethyl)aminocarbonyl,  
 N-(1-methylethyl)-N-propylaminocarbonyl,  
 N-butyl-N-propylaminocarbonyl,  
 N-(1-methylpropyl)-N-propylaminocarbonyl,  
 20 N-(2-methylpropyl)-N-propylaminocarbonyl,  
 N-(1,1-dimethylethyl)-N-propylaminocarbonyl,  
 N-butyl-N-(1-methylethyl)aminocarbonyl,  
 N-(1-methylethyl)-N-(1-methylpropyl)aminocarbonyl,  
 N-(1-methylethyl)-N-(2-methylpropyl)aminocarbonyl,  
 25 N-(1,1-dimethylethyl)-N-(1-methylethyl)aminocarbonyl,  
 N-butyl-N-(1-methylpropyl)aminocarbonyl,  
 N-butyl-N-(2-methylpropyl)aminocarbonyl,  
 N-butyl-N-(1,1-dimethylethyl)aminocarbonyl,  
 N-(1-methylpropyl)-N-(2-methylpropyl)aminocarbonyl,  
 30 N-(1,1-dimethylethyl)-N-(1-methylpropyl)aminocarbonyl or  
 N-(1,1-dimethylethyl)-N-(2-methylpropyl)aminocarbonyl;  
  
 — di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl: di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl,  
 as mentioned above, and also, for example,  
 35 N-methyl-N-pentylaminocarbonyl,  
 N-methyl-N-(1-methylbutyl)aminocarbonyl,  
 N-methyl-N-(2-methylbutyl)aminocarbonyl,  
 N-methyl-N-(3-methylbutyl)aminocarbonyl, N-methyl-N-  
 (2,2-dimethylpropyl)aminocarbonyl,  
 40 N-methyl-N-(1-ethylpropyl)aminocarbonyl,  
 N-methyl-N-hexylaminocarbonyl,  
 N-methyl-N-(1,1-dimethylpropyl)aminocarbonyl, N-methyl-N-  
 (1,2-dimethylpropyl)aminocarbonyl,  
 N-methyl-N-(1-methylpentyl)aminocarbonyl,  
 45 N-methyl-N-(2-methylpentyl)aminocarbonyl,  
 N-methyl-N-(3-methylpentyl)aminocarbonyl,  
 N-methyl-N-(4-methylpentyl)aminocarbonyl, N-methyl-N-

(1,1-dimethylbutyl)aminocarbonyl,  
 N-methyl-N-(1,2-dimethylbutyl)aminocarbonyl,  
 N-methyl-N-(1,3-dimethylbutyl)aminocarbonyl,  
 N-methyl-N-(2,2-dimethylbutyl)aminocarbonyl,  
 5 N-methyl-N-(2,3-dimethylbutyl)aminocarbonyl, N-methyl-N-(3,3-dimethylbutyl)aminocarbonyl,  
 N-methyl-N-(1-ethylbutyl)aminocarbonyl,  
 N-methyl-N-(2-ethylbutyl)aminocarbonyl,  
 N-methyl-N-(1,1,2-trimethylpropyl)aminocarbonyl,  
 10 N-methyl-N-(1,2,2-trimethylpropyl)aminocarbonyl, N-methyl-N-(1-ethyl-1-methylpropyl)aminocarbonyl, N-methyl-N-(1-ethyl-2-methylpropyl)aminocarbonyl,  
 N-ethyl-N-pentylaminocarbonyl,  
 N-ethyl-N-(1-methylbutyl)aminocarbonyl, N-ethyl-  
 15 N-(2-methylbutyl)aminocarbonyl,  
 N-ethyl-N-(3-methylbutyl)aminocarbonyl,  
 N-ethyl-N-(2,2-dimethylpropyl)aminocarbonyl,  
 N-ethyl-N-(1-ethylpropyl)aminocarbonyl,  
 N-ethyl-N-hexylaminocarbonyl,  
 20 N-ethyl-N-(1,1-dimethylpropyl)aminocarbonyl,  
 N-ethyl-N-(1,2-dimethylpropyl)aminocarbonyl,  
 N-ethyl-N-(1-methylpentyl)aminocarbonyl,  
 N-ethyl-N-(2-methylpentyl)aminocarbonyl,  
 N-ethyl-N-(3-methylpentyl)aminocarbonyl,  
 25 N-ethyl-N-(4-methylpentyl)aminocarbonyl,  
 N-ethyl-N-(1,1-dimethylbutyl)aminocarbonyl,  
 N-ethyl-N-(1,2-dimethylbutyl)aminocarbonyl,  
 N-ethyl-N-(1,3-dimethylbutyl)aminocarbonyl,  
 N-ethyl-N-(2,2-dimethylbutyl)aminocarbonyl, N-ethyl-N-(2,3-  
 30 dimethylbutyl)aminocarbonyl,  
 N-ethyl-N-(3,3-dimethylbutyl)aminocarbonyl,  
 N-ethyl-N-(1-ethylbutyl)aminocarbonyl,  
 N-ethyl-N-(2-ethylbutyl)aminocarbonyl,  
 N-ethyl-N-(1,1,2-trimethylpropyl)aminocarbonyl,  
 35 N-ethyl-N-(1,2,2-trimethylpropyl)aminocarbonyl,  
 N-ethyl-N-(1-ethyl-1-methylpropyl)aminocarbonyl,  
 N-ethyl-N-(1-ethyl-2-methylpropyl)aminocarbonyl,  
 N-Propyl-N-pentylaminocarbonyl,  
 N-butyl-N-pentylaminocarbonyl, N,N-dipentylaminocarbonyl,  
 40 N-Propyl-N-hexylaminocarbonyl, N-butyl-N-hexylaminocarbonyl,  
 N-pentyl-N-hexylaminocarbonyl or N,N-dihexylaminocarbonyl;

- di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminothiocarbonyl: for example  
 N,N-dimethylaminothiocarbonyl, N,N-diethylaminothiocarbonyl,  
 45 N,N-di-(1-methylethyl)aminothiocarbonyl,  
 N,N-dipropylaminothiocarbonyl, N,N-dibutylaminothiocarbonyl,  
 N,N-di-(1-methylpropyl)aminothiocarbonyl,

N,N-di-(2-methylpropyl)aminothiocarbonyl,  
 N,N-di-(1,1-dimethylethyl)aminothiocarbonyl,  
 N-ethyl-N-methylaminothiocarbonyl,  
 N-methyl-N-propylaminothiocarbonyl,  
 5 N-methyl-N-(1-methylethyl)aminothiocarbonyl,  
 N-butyl-N-methylaminothiocarbonyl,  
 N-methyl-N-(1-methylpropyl)aminothiocarbonyl,  
 N-methyl-N-(2-methylpropyl)aminothiocarbonyl,  
 N-(1,1-dimethylethyl)-N-methylaminothiocarbonyl,  
 10 N-ethyl-N-propylaminothiocarbonyl,  
 N-ethyl-N-(1-methylethyl)aminothiocarbonyl,  
 N-butyl-N-ethylaminothiocarbonyl,  
 N-ethyl-N-(1-methylpropyl)aminothiocarbonyl,  
 N-ethyl-N-(2-methylpropyl)-aminothiocarbonyl, N-ethyl-N-  
 15 (1,1-dimethylethyl)-aminothiocarbonyl, N-(1-methylethyl)-  
 N-propylaminothiocarbonyl, N-butyl-N-propylaminothiocarbonyl,  
 N-(1-methylpropyl)-N-propylaminothiocarbonyl,  
 N-(2-methylpropyl)-N-propylaminothiocarbonyl,  
 N-(1,1-dimethylethyl)-N-propylaminothiocarbonyl,  
 20 N-butyl-N-(1-methylethyl)aminothiocarbonyl,  
 N-(1-methylethyl)-N-(1-methylpropyl)aminothiocarbonyl,  
 N-(1-methylethyl)-N-(2-methylpropyl)aminothiocarbonyl,  
 N-(1,1-dimethylethyl)-N-(1-methylethyl)aminothiocarbonyl,  
 N-butyl-N-(1-methylpropyl)aminothiocarbonyl,  
 25 N-butyl-N-(2-methylpropyl)aminothiocarbonyl, N-butyl-N-  
 (1,1-dimethylethyl)aminothiocarbonyl, N-(1-methylpropyl)-  
 N-(2-methylpropyl)aminothiocarbonyl,  
 N-(1,1-dimethylethyl)-N-(1-methylpropyl)aminothiocarbonyl,  
 N-(1,1-dimethylethyl)-N-(2-methylpropyl)aminothiocarbonyl,  
 30 N-methyl-N-pentylaminothiocarbonyl,  
 N-methyl-N-(1-methylbutyl)aminothiocarbonyl,  
 N-methyl-N-(2-methylbutyl)aminothiocarbonyl,  
 N-methyl-N-(3-methylbutyl)aminothiocarbonyl, N-methyl-N-  
 (2,2-dimethylpropyl)aminothiocarbonyl,  
 35 N-methyl-N-(1-ethylpropyl)aminothiocarbonyl,  
 N-methyl-N-hexylaminothiocarbonyl,  
 N-methyl-N-(1,1-dimethylpropyl)aminothiocarbonyl, N-methyl-  
 N-(1,2-dimethylpropyl)aminothiocarbonyl, N-methyl-N-  
 (1-methylpentyl)aminothiocarbonyl,  
 40 N-methyl-N-(2-methylpentyl)aminothiocarbonyl,  
 N-methyl-N-(3-methylpentyl)aminothiocarbonyl,  
 N-methyl-N-(4-methylpentyl)aminothiocarbonyl,  
 N-methyl-N-(1,1-dimethylbutyl)aminothiocarbonyl, N-methyl-  
 N-(1,2-dimethylbutyl)aminothiocarbonyl,  
 45 N-methyl-N-(1,3-dimethylbutyl)aminothiocarbonyl,  
 N-methyl-N-(2,2-dimethylbutyl)aminothiocarbonyl,  
 N-methyl-N-(2,3-dimethylbutyl)aminothiocarbonyl,

N-methyl-N-(3,3-dimethylbutyl)aminothiocarbonyl,  
 N-methyl-N-(1-ethylbutyl)aminothiocarbonyl,  
 N-methyl-N-(2-ethylbutyl)aminothiocarbonyl, N-methyl-N-ethyl-  
 N-(1,1,2-trimethylpropyl)aminothiocarbonyl, N-methyl-N-  
 5 (1,2,2-trimethylpropyl)aminothiocarbonyl, N-methyl-N-(1-  
 ethyl-1-methylpropyl)aminothiocarbonyl, N-methyl-N-(1-ethyl-  
 2-methylpropyl)aminothiocarbonyl,  
 N-ethyl-N-pentylaminothiocarbonyl,  
 N-ethyl-N-(1-methylbutyl)aminothiocarbonyl,  
 10 N-ethyl-N-(2-methylbutyl)aminothiocarbonyl, N-ethyl-N-(3-  
 methylbutyl)aminothiocarbonyl,  
 N-ethyl-N-(2,2-dimethylpropyl)aminothiocarbonyl,  
 N-ethyl-N-(1-ethylpropyl)aminothiocarbonyl,  
 N-ethyl-N-hexylaminothiocarbonyl, N-ethyl-N-  
 15 (1,1-dimethylpropyl)aminothiocarbonyl, N-ethyl-N-(1,2-  
 dimethylpropyl)aminothiocarbonyl,  
 N-ethyl-N-(1-methylpentyl)aminothiocarbonyl,  
 N-ethyl-N-(2-methylpentyl)aminothiocarbonyl,  
 N-ethyl-N-(3-methylpentyl)aminothiocarbonyl,  
 20 N-ethyl-N-(4-methylpentyl)aminothiocarbonyl, N-ethyl-N-  
 (1,1-dimethylbutyl)aminothiocarbonyl, N-ethyl-N-(1,2-  
 dimethylbutyl)aminothiocarbonyl,  
 N-ethyl-N-(1,3-dimethylbutyl)aminothiocarbonyl,  
 N-ethyl-N-(2,2-dimethylbutyl)aminothiocarbonyl,  
 25 N-ethyl-N-(2,3-dimethylbutyl)aminothiocarbonyl,  
 N-ethyl-N-(3,3-dimethylbutyl)aminothiocarbonyl,  
 N-ethyl-N-(1-ethylbutyl)aminothiocarbonyl, N-ethyl-N-(2-  
 ethylbutyl)aminothiocarbonyl,  
 N-ethyl-N-(1,1,2-trimethylpropyl)aminothiocarbonyl,  
 30 N-ethyl-N-(1,2,2-trimethylpropyl)aminothiocarbonyl,  
 N-ethyl-N-(1-ethyl-1-methylpropyl)aminothiocarbonyl,  
 N-ethyl-N-(1-ethyl-2-methylpropyl)aminothiocarbonyl,  
 N-Propyl-N-pentylaminothiocarbonyl,  
 N-butyl-N-pentylaminothiocarbonyl,  
 35 N,N-dipentylaminothiocarbonyl,  
 N-Propyl-N-hexylaminothiocarbonyl,  
 N-butyl-N-hexylaminothiocarbonyl,  
 N-pentyl-N-hexylaminothiocarbonyl or  
 N,N-dihexylaminothiocarbonyl;  
 40  
 - C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by  
 C<sub>1</sub>-C<sub>4</sub>-alkoxy as mentioned above, i.e., for example,  
 methoxymethyl, ethoxymethyl, propoxymethyl,  
 (1-methylethoxy)methyl, butoxymethyl,  
 45 (1-methylpropoxy)methyl, (2-methylpropoxy)methyl,  
 (1,1-dimethylethoxy)methyl, 2-(methoxy)ethyl,  
 2-(ethoxy)ethyl, 2-(propoxy)ethyl, 2-(1-methylethoxy)ethyl,

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2-(butoxy)ethyl, 2-(1-methylpropoxy)ethyl,  
2-(2-methylpropoxy)ethyl, 2-(1,1-dimethylethoxy)ethyl,  
2-(methoxy)-propyl, 2-(ethoxy)propyl, 2-(propoxy)propyl,  
2-(1-methylethoxy)propyl, 2-(butoxy)propyl,  
5 2-(1-methylpropoxy)propyl, 2-(2-methylpropoxy)propyl,  
2-(1,1-dimethylethoxy)propyl, 3-(methoxy)propyl,  
3-(ethoxy)propyl, 3-(propoxy)propyl,  
3-(1-methylethoxy)propyl, 3-(butoxy)propyl,  
10 3-(1-methylpropoxy)propyl, 3-(2-methylpropoxy)propyl,  
3-(1,1-dimethylethoxy)propyl, 2-(methoxy)butyl,  
2-(ethoxy)butyl, 2-(propoxy)butyl, 2-(1-methylethoxy)butyl,  
2-(butoxy)butyl, 2-(1-methylpropoxy)butyl,  
2-(2-methylpropoxy)butyl, 2-(1,1-dimethylethoxy)butyl,  
15 3-(methoxy)butyl, 3-(ethoxy)butyl, 3-(propoxy)butyl,  
3-(1-methylethoxy)butyl, 3-(butoxy)butyl,  
3-(1-methylpropoxy)butyl, 3-(2-methylpropoxy)butyl,  
3-(1,1-dimethylethoxy)butyl, 4-(methoxy)butyl, 4-(ethoxy)-  
butyl, 4-(propoxy)butyl, 4-(1-methylethoxy)butyl,  
20 4-(butoxy)butyl, 4-(1-methylpropoxy)butyl,  
4-(2-methylpropoxy)butyl or 4-(1,1-dimethylethoxy)butyl;

- C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxy, and the alkoxyalkoxy moieties of C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl: C<sub>1</sub>-C<sub>4</sub>-alkoxy which is substituted by C<sub>1</sub>-C<sub>4</sub>-alkoxy as mentioned above, i.e., for example, methoxymethoxy, ethoxymethoxy, propoxymethoxy, (1-methylethoxy)methoxy, butoxymethoxy, (1-methylpropoxy)methoxy, (2-methylpropoxy)methoxy, (1,1-dimethylethoxy)methoxy, 2-(methoxy)ethoxy, 2-(ethoxy)ethoxy, 2-(propoxy)ethoxy, 2-(1-methylethoxy)ethoxy, 2-(butoxy)ethoxy, 2-(1-methylpropoxy)ethoxy, 2-(2-methylpropoxy)ethoxy, 2-(1,1-dimethylethoxy)ethoxy, 2-(methoxy)propoxy, 2-(ethoxy)propoxy, 2-(propoxy)propoxy, 2-(1-methylethoxy)propoxy, 2-(butoxy)propoxy, 2-(1-methylpropoxy)propoxy, 2-(2-methylpropoxy)propoxy, 2-(1,1-dimethylethoxy)propoxy, 3-(methoxy)propoxy, 3-(ethoxy)propoxy, 3-(propoxy)propoxy, 3-(1-methylethoxy)propoxy, 3-(butoxy)propoxy, 3-(1-methylpropoxy)propoxy, 3-(2-methylpropoxy)propoxy, 3-(1,1-dimethylethoxy)propoxy, 2-(methoxy)butoxy, 2-(ethoxy)butoxy, 2-(propoxy)butoxy, 2-(1-methylethoxy)butoxy, 2-(butoxy)butoxy, 2-(1-methylpropoxy)butoxy, 2-(2-methylpropoxy)butoxy, 2-(1,1-dimethylethoxy)butoxy, 3-(methoxy)butoxy, 3-(ethoxy)butoxy, 3-(propoxy)butoxy, 3-(1-methylethoxy)butoxy, 3-(butoxy)butoxy, 3-(1-methylpropoxy)butoxy, 3-(2-methylpropoxy)butoxy, 3-(1,1-dimethylethoxy)butoxy, 4-(methoxy)butoxy,

4-(ethoxy)butoxy, 4-(propoxy)butoxy,  
 4-(1-methylethoxy)butoxy, 4-(butoxy)butoxy,  
 4-(1-methylpropoxy)butoxy, 4-(2-methylpropoxy)butoxy or  
 4-(1,1-dimethylethoxy)butoxy;

5

- $C_3$ - $C_6$ -alkenyl, and the alkenyl moieties of  
 $C_3$ - $C_6$ -alkenylcarbonyl,  $C_3$ - $C_6$ -alkenylloxy,  
 $C_3$ - $C_6$ -alkenylloxy carbonyl,  $C_3$ - $C_6$ -alkenylaminocarbonyl,  
 $N-(C_3-C_6\text{-alkenyl})-N-(C_1-C_6\text{-alkyl})\text{aminocarbonyl}$ ,
- 10  $N-(C_3-C_6\text{-alkenyl})-N-(C_1-C_6\text{-alkoxy})\text{aminocarbonyl}$ : for example  
 $\text{prop-2-en-1-yl}$ ,  $\text{but-1-en-4-yl}$ ,  $\text{1-methyl-prop-2-en-1-yl}$ ,  
 $\text{2-methylprop-2-en-1-yl}$ ,  $\text{2-buten-1-yl}$ ,  $\text{1-penten-3-yl}$ ,  
 $\text{1-penten-4-yl}$ ,  $\text{2-penten-4-yl}$ ,  $\text{1-methylbut-2-en-1-yl}$ ,  
 $\text{2-methylbut-2-en-1-yl}$ ,  $\text{3-methylbut-2-en-1-yl}$ ,
- 15  $\text{1-methylbut-3-en-1-yl}$ ,  $\text{2-methylbut-3-en-1-yl}$ ,  
 $\text{3-methylbut-3-en-1-yl}$ ,  $\text{1,1-dimethylprop-2-en-1-yl}$ ,  
 $\text{1,2-dimethylprop-2-en-1-yl}$ ,  $\text{1-ethylprop-2-en-1-yl}$ ,  
 $\text{hex-3-en-1-yl}$ ,  $\text{hex-4-en-1-yl}$ ,  $\text{hex-5-en-1-yl}$ ,  
 $\text{1-methylpent-3-en-1-yl}$ ,  $\text{2-methylpent-3-en-1-yl}$ ,
- 20  $\text{3-methylpent-3-en-1-yl}$ ,  $\text{4-methylpent-3-en-1-yl}$ ,  
 $\text{1-methylpent-4-en-1-yl}$ ,  $\text{2-methylpent-4-en-1-yl}$ ,  
 $\text{3-methylpent-4-en-1-yl}$ ,  $\text{4-methylpent-4-en-1-yl}$ ,  
 $\text{1,1-dimethylbut-2-en-1-yl}$ ,  $\text{1,1-dimethylbut-3-en-1-yl}$ ,  
 $\text{1,2-dimethylbut-2-en-1-yl}$ ,  $\text{1,2-dimethylbut-3-en-1-yl}$ ,
- 25  $\text{1,3-dimethylbut-2-en-1-yl}$ ,  $\text{1,3-dimethylbut-3-en-1-yl}$ ,  
 $\text{2,2-dimethylbut-3-en-1-yl}$ ,  $\text{2,3-dimethylbut-2-en-1-yl}$ ,  
 $\text{2,3-dimethylbut-3-en-1-yl}$ ,  $\text{3,3-dimethylbut-2-en-1-yl}$ ,  
 $\text{1-ethylbut-2-en-1-yl}$ ,  $\text{1-ethylbut-3-en-1-yl}$ ,  
 $\text{2-ethylbut-2-en-1-yl}$ ,  $\text{2-ethylbut-3-en-1-yl}$ ,
- 30  $\text{1,1,2-trimethylprop-2-en-1-yl}$ ,  $\text{1-ethyl-1-methylprop-2-en-1-yl}$   
 or  $\text{1-ethyl-2-methylprop-2-en-1-yl}$ ;

$C_2$ - $C_6$ -alkenyl, and the alkenyl moieties of

35  $C_2$ - $C_6$ -alkenylcarbonyl, phenyl- $C_2$ - $C_6$ -alkenylcarbonyl and  
 heterocyclyl- $C_2$ - $C_6$ -alkenylcarbonyl:  $C_3$ - $C_6$ -alkenyl as mentioned  
 above, and also ethenyl;

- $C_3$ - $C_6$ -haloalkenyl: a  $C_3$ - $C_6$ -alkenyl radical as mentioned above  
 which is partially or fully substituted by fluorine,  
 chlorine, bromine and/or iodine, i.e., for example,  
 $\text{2-chloroallyl}$ ,  $\text{3-chloroallyl}$ ,  $\text{2,3-dichloroallyl}$ ,  
 $\text{3,3-dichloroallyl}$ ,  $\text{2,3,3-trichloroallyl}$ ,  
 $\text{2,3-dichlorobut-2-enyl}$ ,  $\text{2-bromoallyl}$ ,  $\text{3-bromoallyl}$ ,  
 $\text{2,3-dibromoallyl}$ ,  $\text{3,3-dibromoallyl}$ ,  $\text{2,3,3-tribromoallyl}$  or  
 $\text{2,3-dibromobut-2-enyl}$ ;

- $C_3-C_6$ -alkynyl, and the alkynyl moieties of  $C_3-C_6$ -alkynylcarbonyl,  $C_3-C_6$ -alkynyloxy,  $C_3-C_6$ -alkynyloxycarbonyl,  $C_3-C_6$ -alkynylaminocarbonyl,  $N-(C_3-C_6\text{-alkynyl})-N-(C_1-C_6\text{-alkyl})\text{aminocarbonyl}$ ,
- 5  $N-(C_3-C_6\text{-alkynyl})-N-(C_1-C_6\text{-alkoxyaminocarbonyl}$ : for example propargyl, but-1-yn-3-yl, but-1-yn-4-yl, but-2-yn-1-yl, pent-1-yn-3-yl, pent-1-yn-4-yl, pent-1-yn-5-yl, pent-2-yn-1-yl, pent-2-yn-4-yl, pent-2-yn-5-yl, 3-methyl-but-1-yn-3-yl, 3-methylbut-1-yn-4-yl, hex-1-yn-3-yl, hex-1-yn-4-yl, hex-1-yn-5-yl, hex-1-yn-6-yl, hex-2-yn-1-yl, hex-2-yn-4-yl, hex-2-yn-5-yl, hex-2-yn-6-yl, hex-3-yn-1-yl, hex-3-yn-2-yl, 3-methylpent-1-yn-3-yl, 3-methylpent-1-yn-4-yl, 3-methylpent-1-yn-5-yl, 4-methylpent-2-yn-4-yl or 4-methylpent-2-yn-5-yl;
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

- $C_2-C_6$ -alkynyl, and the alkynyl moieties of  $C_2-C_6$ -alkynylcarbonyl:  $C_3-C_6$ -alkynyl as mentioned above, and also ethynyl;
- $C_3-C_6$ -haloalkynyl: a  $C_3-C_6$ -alkynyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e., for example, 1,1-difluoroprop-2-yn-1-yl, 3-iodoprop-2-yn-1-yl, 4-fluorobut-2-yn-1-yl, 4-chlorobut-2-yn-1-yl, 1,1-difluorobut-2-yn-1-yl, 4-iodobut-3-yn-1-yl, 5-fluoropent-3-yn-1-yl, 5-iodopent-4-yn-1-yl, 6-fluorohex-4-yn-1-yl or 6-iodohex-5-yn-1-yl;
- $C_3-C_6$ -cycloalkyl, and the cycloalkyl moieties of  $C_3-C_6$ -cycloalkylcarbonyl: for example cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl;
- heterocyclyl, and the heterocyclyl moieties of heterocyclylcarbonyl, heterocyclyl- $C_1-C_6$ -alkyl, heterocyclloxy, heterocyclylthio, heterocyclloxyalkylcarbonyl, heterocyclloxyloxycarbonyl, heterocyclloxythiocarbonyl, heterocyclylcarbonyl- $C_1-C_6$ -alkyl,  $N-(C_1-C_6\text{-alkyl})-N-(\text{heterocyclyl})\text{aminocarbonyl}$ ,
- heterocyclylaminocarbonyl: a saturated, partially saturated or unsaturated 5- or 6-membered heterocyclic ring which is attached via a carbon and has one to four identical or different hetero atoms selected from the following group: oxygen, sulfur or nitrogen, i.e., for example, 5-membered rings having a hetero atom such as, for example:

tetrahydrofuran-2-yl, tetrahydrofuran-3-yl, tetrahydrothien-  
 2-yl, tetrahydrothien-3-yl, tetrahydropyrrol-2-yl,  
 tetrahydropyrrol-3-yl, 2,3-dihydrofuran-2-yl,  
 2,3-dihydrofuran-3-yl, 2,5-dihydrofuran-2-yl,  
 5 2,5-dihydrofuran-3-yl, 4,5-dihydrofuran-2-yl,  
 4,5-dihydrofuran-3-yl, 2,3-dihydrothien-2-yl,  
 2,3-dihydrothien-3-yl, 2,5-dihydrothien-2-yl,  
 2,5-dihydrothien-3-yl, 4,5-dihydrothien-2-yl,  
 4,5-dihydrothien-3-yl, 2,3-dihydro-1H-pyrrol-2-yl,  
 10 2,3-dihydro-1H-pyrrol-3-yl, 2,5-dihydro-1H-pyrrol-2-yl,  
 2,5-dihydro-1H-pyrrol-3-yl, 4,5-dihydro-1H-pyrrol-2-yl,  
 4,5-dihydro-1H-pyrrol-3-yl, 3,4-dihydro-2H-pyrrol-2-yl,  
 3,4-dihydro-2H-pyrrol-3-yl, 3,4-dihydro-5H-pyrrol-2-yl,  
 3,4-dihydro-5H-pyrrol-3-yl, 2-furyl, 3-furyl, 2-thienyl,  
 15 3-thienyl, pyrrol-2-yl or pyrrol-3-yl;

5-membered rings having two hetero atoms such as, for example,

20 tetrahydropyrazol-3-yl, tetrahydropyrazol-3-yl,  
 tetrahydropyrazol-4-yl, tetrahydroisoxazol-3-yl,  
 tetrahydroisoxazol-4-yl, tetrahydroisoxazol-5-yl,  
 1,2-oxathiolan-3-yl, 1,2-oxathiolan-4-yl,  
 25 1,2-oxathiolan-5-yl, tetrahydroisothiazol-3-yl,  
 tetrahydroisothiazol-4-yl, tetrahydroisothiazol-5-yl,  
 1,2-dithiolan-3-yl, 1,2-dithiolan-4-yl,  
 tetrahydroimidazol-2-yl, tetrahydroimidazol-4-yl,  
 tetrahydrooxazol-2-yl, tetrahydrooxazol-4-yl,  
 30 tetrahydrooxazol-5-yl, tetrahydrothiazol-2-yl,  
 tetrahydrothiazol-4-yl, tetrahydrothiazol-5-yl,  
 1,3-dioxolan-2-yl, 1,3-dioxolan-4-yl, 1,3-oxathiolan-2-yl,  
 1,3-oxathiolan-4-yl, 1,3-oxathiolan-5-yl, 1,3-dithiolan-2-yl,  
 1,3-dithiolan-4-yl, 4,5-dihydro-1H-pyrazol-3-yl,  
 35 4,5-dihydro-1H-pyrazol-4-yl, 4,5-dihydro-1H-pyrazol-5-yl,  
 2,5-dihydro-1H-pyrazol-3-yl, 2,5-dihydro-1H-pyrazol-4-yl,  
 2,5-dihydro-1H-pyrazol-5-yl, 4,5-dihydroisoxazol-3-yl,  
 4,5-dihydroisoxazol-4-yl, 4,5-dihydroisoxazol-5-yl,  
 2,5-dihydroisoxazol-3-yl, 2,5-dihydroisoxazol-4-yl,  
 40 2,5-dihydroisoxazol-5-yl, 2,3-dihydroisoxazol-3-yl,  
 2,3-dihydroisoxazol-4-yl, 2,3-dihydroisoxazol-5-yl,  
 4,5-dihydroisothiazol-3-yl, 4,5-dihydroisothiazol-4-yl,  
 4,5-dihydroisothiazol-5-yl, 2,5-dihydroisothiazol-3-yl,  
 2,5-dihydroisothiazol-4-yl, 2,5-dihydroisothiazol-5-yl,  
 45 2,3-dihydroisothiazol-3-yl, 2,3-dihydroisothiazol-4-yl,  
 2,3-dihydroisothiazol-  
 5-yl,  $\Delta^3$ -1,2-dithiol-3-yl,  $\Delta^3$ -1,2-dithiol-4-yl,  
 $\Delta^3$ -1,2-dithiol-5-yl, 4,5-dihydro-1H-imidazol-2-yl,

4,5-dihydro-1H-imidazol-4-yl, 4,5-dihydro-1H-imidazol-5-yl,  
 2,5-dihydro-1H-imidazol-2-yl, 2,5-dihydro-1H-imidazol-4-yl,  
 2,5-dihydro-1H-imidazol-5-yl, 2,3-dihydro-1H-imidazol-2-yl,  
 2,3-dihydro-1H-imidazol-4-yl, 4,5-dihydrooxazol-2-yl,  
 5 4,5-dihydrooxazol-4-yl, 4,5-dihydrooxazol-5-yl,  
 2,5-dihydrooxazol-2-yl, 2,5-dihydrooxazol-4-yl,  
 2,5-dihydrooxazol-5-yl, 2,3-dihydrooxazol-2-yl,  
 2,3-dihydrooxazol-4-yl, 2,3-dihydrooxazol-5-yl,  
 4,5-dihydrothiazol-2-yl, 4,5-dihydrothiazol-4-yl,  
 10 4,5-dihydrothiazol-5-yl, 2,5-dihydrothiazol-2-yl,  
 2,5-dihydrothiazol-4-yl, 2,5-dihydrothiazol-5-yl,  
 2,3-dihydrothiazol-2-yl, 2,3-dihydrothiazol-4-yl,  
 2,3-dihydrothiazol-5-yl, 1,3-dioxol-2-yl, 1,3-dioxol-4-yl,  
 1,3-dithiol-2-yl, 1,3-dithiol-4-yl, 1,3-oxathiol-2-yl,  
 15 1,3-oxathiol-4-yl, 1,3-oxathiol-5-yl, pyrazol-3-yl,  
 pyrazol-4-yl, isoxazol-3-yl, isoxazol-4-yl, isoxazol-5-yl,  
 isothiazol-3-yl, isothiazol-4-yl, isothiazol-5-yl,  
 imidazol-2-yl, imidazol-4-yl, oxazol-2-yl, oxazol-4-yl,  
 oxazol-5-yl, thiazol-2-yl, thiazol-4-yl or thiazol-5-yl;  
 20

5-membered rings having 3 hetero atoms such as, for example,  
 1,2,3- $\Delta^2$ -oxadiazolin-4-yl, 1,2,3- $\Delta^2$ -oxadiazolin-5-yl,  
 1,2,4- $\Delta^4$ -oxadiazolin-3-yl, 1,2,4- $\Delta^4$ -oxadiazolin-5-yl,  
 25 1,2,4- $\Delta^2$ -oxadiazolin-3-yl, 1,2,4- $\Delta^2$ -oxadiazolin-5-yl,  
 1,2,4- $\Delta^3$ -oxadiazolin-3-yl, 1,2,4- $\Delta^3$ -oxadiazolin-5-yl,  
 1,3,4- $\Delta^2$ -oxadiazolin-2-yl, 1,3,4- $\Delta^2$ -oxadiazolin-5-yl,  
 1,3,4- $\Delta^3$ -oxadiazolin-2-yl, 1,3,4-oxadiazolin-2-yl,  
 1,2,4- $\Delta^4$ -thiadiazolin-3-yl, 1,2,4- $\Delta^4$ -thiadiazolin-5-yl,  
 30 1,2,4- $\Delta^3$ -thiadiazolin-3-yl, 1,2,4- $\Delta^3$ -thiadiazolin-5-yl,  
 1,2,4- $\Delta^2$ -thiadiazolin-3-yl, 1,2,4- $\Delta^2$ -thiadiazolin-5-yl,  
 1,3,4- $\Delta^2$ -thiadiazolin-2-yl, 1,3,4- $\Delta^2$ -thiadiazolin-5-yl,  
 1,3,4- $\Delta^3$ -thiadiazolin-2-yl, 1,3,4-thiadiazolin-2-yl,  
 1,3,2-dioxathiolan-4-yl, 1,2,3- $\Delta^2$ -triazolin-4-yl,  
 35 1,2,3- $\Delta^2$ -triazolin-5-yl, 1,2,4- $\Delta^2$ -triazolin-3-yl,  
 1,2,4- $\Delta^2$ -triazolin-5-yl, 1,2,4- $\Delta^3$ -triazolin-3-yl,  
 1,2,4- $\Delta^3$ -triazolin-5-yl, 1,2,4- $\Delta^1$ -triazolin-2-yl,  
 1,2,4-triazolin-3-yl, 3H-1,2,4-dithiazol-5-yl,  
 2H-1,3,4-dithiazol-5-yl, 2H-1,3,4-oxathiazol-5-yl,  
 40 1,2,3-oxadiazol-4-yl, 1,2,3-oxadiazol-5-yl,  
 1,2,4-oxadiazol-3-yl, 1,2,4-oxadiazol-5-yl,  
 1,3,4-oxadiazol-2-yl, 1,2,3-thiadiazol-4-yl,  
 1,2,3-thiadiazol-5-yl, 1,2,4-thiadiazol-3-yl,  
 1,2,4-thiadiazol-5-yl, 1,3,4-thiadiazolyl-2-yl,  
 45 1,2,3-triazol-4-yl or 1,2,4-triazol-3-yl;

5-membered rings having 4 hetero atoms such as, for example,

tetrazol-5-yl,

6-membered rings having 1 hetero atom such as, for example:

5      tetrahydropyran-2-yl, tetrahydropyran-3-yl,  
       tetrahydropyran-4-yl, piperidin-2-yl, piperidin-3-yl,  
       piperidin-4-yl, tetrahydrothiopyran-2-yl,  
       tetrahydrothiopyran-3-yl, tetrahydrothiopyran-4-yl,  
 10     2H-3,4-dihydropyran-6-yl, 2H-3,4-dihydropyran-5-yl,  
       2H-3,4-dihydropyran-4-yl, 2H-3,4-dihydropyran-3-yl,  
       2H-3,4-dihydropyran-2-yl, 2H-3,4-dihydropyran-6-yl,  
       2H-3,4-dihydrothiopyran-5-yl, 2H-3,4-dihydrothiopyran-4-yl,  
       2H-3,4-dihydropyran-3-yl, 2H-3,4-dihydropyran-2-yl,  
 15     1,2,3,4-tetrahydropyridin-6-yl,  
       1,2,3,4-tetrahydropyridin-5-yl, 1,2,3,4-tetrahydropyridin-4-  
       yl, 1,2,3,4-tetrahydropyridin-3-yl,  
       1,2,3,4-tetrahydropyridin-2-yl, 2H-5,6-dihydropyran-2-yl,  
       2H-5,6-dihydropyran-3-yl, 2H-5,6-dihydropyran-4-yl,  
 20     2H-5,6-dihydropyran-5-yl, 2H-5,6-dihydropyran-6-yl,  
       2H-5,6-dihydrothiopyran-2-yl, 2H-5,6-dihydrothiopyran-3-yl,  
       2H-5,6-dihydrothiopyran-4-yl, 2H-5,6-dihydrothiopyran-5-yl,  
       2H-5,6-dihydrothiopyran-6-yl, 1,2,5,6-tetrahydropyridin-2-yl,  
       1,2,5,6-tetrahydropyridin-3-yl, 1,2,5,6-tetrahydro-  
 25     pyridin-4-yl, 1,2,5,6-tetrahydropyridin-5-yl, 1,2,5,6-  
       tetrahydropyridin-6-yl, 2,3,4,5-tetrahydropyridin-2-yl,  
       2,3,4,5-tetrahydropyridin-3-yl, 2,3,4,5-tetra-  
       hydropyridin-4-yl, 2,3,4,5-tetrahydropyridin-5-yl,  
       2,3,4,5-tetrahydropyridin-6-yl, 4H-pyran-2-yl, 4H-pyran-3-yl,  
 30     4H-pyran-4-yl, 4H-thiopyran-2-yl, 4H-thiopyran-3-yl,  
       4H-thiopyran-4-yl, 1,4-dihydropyridin-2-yl,  
       1,4-dihydropyridin-3-yl, 1,4-dihydropyridin-4-yl,  
       2H-pyran-2-yl, 2H-pyran-3-yl, 2H-pyran-4-yl, 2H-pyran-5-yl,  
       2H-pyran-6-yl, 2H-thiopyran-2-yl, 2H-thiopyran-3-yl,  
 35     2H-thiopyran-4-yl, 2H-thiopyran-5-yl, 2H-thiopyran-6-yl,  
       1,2-dihydropyridin-2-yl, 1,2-dihydropyridin-3-yl,  
       1,2-dihydropyridin-4-yl, 1,2-dihydropyridin-5-yl,  
       1,2-dihydropyridin-6-yl, 3,4-dihydropyridin-2-yl,  
       3,4-dihydropyridin-3-yl, 3,4-dihydropyridin-4-yl,  
 40     3,4-dihydropyridin-5-yl, 3,4-dihydropyridin-6-yl,  
       2,5-dihydropyridin-2-yl, 2,5-dihydropyridin-3-yl,  
       2,5-dihydropyridin-4-yl, 2,5-dihydropyridin-5-yl,  
       2,5-dihydropyridin-6-yl, 2,3-dihydropyridin-2-yl,  
       2,3-dihydropyridin-3-yl, 2,3-dihydropyridin-4-yl,  
 45     2,3-dihydropyridin-5-yl, 2,3-dihydropyridin-6-yl,  
       pyridin-2-yl, pyridin-3-yl or pyridin-4-yl;

6-membered rings having 2 hetero atoms such as, for example,

1,3-dioxan-2-yl, 1,3-dioxan-4-yl, 1,3-dioxan-5-yl,  
 1,4-dioxan-2-yl, 1,3-dithian-2-yl, 1,3-dithian-4-yl,  
 5 1,3-dithian-5-yl, 1,4-dithian-2-yl, 1,3-oxathian-2-yl,  
 1,3-oxathian-4-yl, 1,3-oxathian-5-yl, 1,3-oxathian-6-yl,  
 1,4-oxathian-2-yl, 1,4-oxathian-3-yl, 1,2-dithian-3-yl,  
 1,2-dithian-4-yl, hexahydropyrimidin-2-yl,  
 hexahydropyrimidin-4-yl, hexahydropyrimidin-5-yl,  
 10 hexahydropyrazin-2-yl, hexahydropyridazin-3-yl,  
 hexahydropyridazin-4-yl, tetrahydro-1,3-oxazin-2-yl,  
 tetrahydro-1,3-oxazin-4-yl, tetrahydro-1,3-oxazin-5-yl,  
 tetrahydro-1,3-oxazin-6-yl, tetrahydro-1,3-thiazin-2-yl,  
 tetrahydro-1,3-thiazin-4-yl, tetrahydro-1,3-thiazin-5-yl,  
 15 tetrahydro-1,3-thiazin-6-yl, tetrahydro-1,4-thiazin-2-yl,  
 tetrahydro-1,4-thiazin-3-yl, tetrahydro-1,4-oxazin-2-yl,  
 tetrahydro-1,4-oxazin-3-yl, tetrahydro-1,2-oxazin-3-yl,  
 tetrahydro-1,2-oxazin-4-yl, tetrahydro-1,2-oxazin-5-yl,  
 20 tetrahydro-1,2-oxazin-6-yl, 2H-5,6-dihydro-1,2-oxazin-3-yl,  
 2H-5,6-dihydro-1,2-oxazin-4-yl, 2H-5,6-dihydro-1,2-oxazin-5-yl,  
 2H-5,6-dihydro-1,2-oxazin-6-yl, 2H-5,6-dihydro-  
 25 1,2-thiazin-3-yl, 2H-5,6-dihydro-1,2-thiazin-4-yl,  
 2H-5,6-dihydro-1,2-thiazin-5-yl, 2H-5,6-dihydro-1,2-  
 thiazin-6-yl, 4H-5,6-dihydro-1,2-oxazin-3-yl,  
 4H-5,6-dihydro-1,2-oxazin-4-yl, 4H-5,6-dihydro-  
 30 1,2-oxazin-5-yl, 4H-5,6-dihydro-1,2-oxazin-6-yl,  
 4H-5,6-dihydro-1,2-thiazin-3-yl, 4H-5,6-dihydro-1,2-  
 thiazin-4-yl, 4H-5,6-dihydro-1,2-thiazin-5-yl,  
 35 4H-5,6-dihydro-1,2-thiazin-6-yl, 2H-3,6-dihydro-1,2-  
 oxazin-3-yl, 2H-3,6-dihydro-1,2-oxazin-4-yl,  
 2H-3,6-dihydro-1,2-oxazin-5-yl, 2H-3,6-dihydro-1,2-  
 oxazin-6-yl, 2H-3,6-dihydro-1,2-thiazin-3-yl,  
 40 2H-3,6-dihydro-1,2-thiazin-4-yl, 2H-3,6-dihydro-1,2-  
 thiazin-5-yl, 2H-3,6-dihydro-1,2-thiazin-6-yl,  
 2H-3,4-dihydro-1,2-oxazin-3-yl, 2H-3,4-dihydro-1,2-  
 oxazin-4-yl, 2H-3,4-dihydro-1,2-oxazin-5-yl,  
 45 2H-3,4-dihydro-1,2-oxazin-6-yl, 2H-3,4-dihydro-1,2-  
 thiazin-3-yl, 2H-3,4-dihydro-1,2-thiazin-4-yl,  
 2H-3,4-dihydro-1,2-thiazin-5-yl, 2H-3,4-dihydro-  
 1,2-thiazin-6-yl, 2,3,4,5-tetrahydropyridazin-3-yl,  
 2,3,4,5-tetrahydropyridazin-4-yl,  
 2,3,4,5-tetrahydropyridazin-5-yl,  
 2,3,4,5-tetrahydropyridazin-6-yl,  
 3,4,5,6-tetrahydropyridazin-3-yl,  
 3,4,5,6-tetrahydropyridazin-4-yl,  
 1,2,5,6-tetrahydropyridazin-3-yl,

1,2,5,6-tetrahydropyridazin-4-yl,  
 1,2,5,6-tetrahydropyridazin-5-yl,  
 1,2,5,6-tetrahydropyridazin-6-yl,  
 1,2,3,6-tetrahydropyridazin-3-yl,  
 5 1,2,3,6-tetrahydropyridazin-4-yl,  
 4H-5,6-dihydro-1,3-oxazin-2-yl,  
 4H-5,6-dihydro-1,3-oxazin-4-yl,  
 4H-5,6-dihydro-1,3-oxazin-5-yl,  
 4H-5,6-dihydro-1,3-oxazin-6-yl,  
 10 4H-5,6-dihydro-1,3-thiazin-2-yl,  
 4H-5,6-dihydro-1,3-thiazin-4-yl,  
 4H-5,6-dihydro-1,3-thiazin-5-yl, 4H-5,6-dihydro-  
 1,3-thiazin-6-yl, 3,4,5,6-tetrahydropyrimidin-2-yl,  
 15 3,4,5,6-tetrahydropyrimidin-4-yl, 3,4,5,6-tetrahydro-  
 pyrimidin-5-yl, 3,4,5,6-tetrahydropyrimidin-6-yl,  
 1,2,3,4-tetrahydropyrazin-2-yl, 1,2,3,4-tetrahydro-  
 pyrazin-5-yl, 1,2,3,4-tetrahydropyrimidin-2-yl,  
 1,2,3,4-tetrahydropyrimidin-4-yl, 1,2,3,4-tetrahydro-  
 pyrimidin-5-yl, 1,2,3,4-tetrahydropyrimidin-6-yl,  
 20 2,3-dihydro-1,4-thiazin-2-yl, 2,3-dihydro-1,4-thiazin-3-yl,  
 2,3-dihydro-1,4-thiazin-5-yl, 2,3-dihydro-1,4-thiazin-6-yl,  
 2H-1,2-oxazin-3-yl, 2H-1,2-oxazin-4-yl, 2H-1,2-oxazin-5-yl,  
 2H-1,2-oxazin-6-yl, 2H-1,2-thiazin-3-yl, 2H-1,2-thiazin-4-yl,  
 2H-1,2-thiazin-5-yl, 2H-1,2-thiazin-6-yl, 4H-1,2-oxazin-3-yl,  
 25 4H-1,2-oxazin-4-yl, 4H-1,2-oxazin-5-yl, 4H-1,2-oxazin-6-yl,  
 4H-1,2-thiazin-3-yl, 4H-1,2-thiazin-4-yl,  
 4H-1,2-thiazin-5-yl, 4H-1,2-thiazin-6-yl, 6H-1,2-oxazin-3-yl,  
 6H-1,2-oxazin-4-yl, 6H-1,2-oxazin-5-yl, 6H-1,2-oxazin-6-yl,  
 6H-1,2-thiazin-3-yl, 6H-1,2-thiazin-4-yl,  
 30 6H-1,2-thiazin-5-yl, 6H-1,2-thiazin-6-yl, 2H-1,3-oxazin-2-yl,  
 2H-1,3-oxazin-4-yl, 2H-1,3-oxazin-5-yl, 2H-1,3-oxazin-6-yl,  
 2H-1,3-thiazin-2-yl, 2H-1,3-thiazin-4-yl, 2H-1,3-thiazin-5-  
 yl, 2H-1,3-thiazin-6-yl, 4H-1,3-oxazin-2-yl, 4H-1,3-oxazin-  
 4-yl, 4H-1,3-oxazin-5-yl, 4H-1,3-oxazin-6-yl, 4H-1,3-thiazin-  
 35 2-yl, 4H-1,3-thiazin-4-yl, 4H-1,3-thiazin-5-yl,  
 4H-1,3-thiazin-6-yl, 6H-1,3-oxazin-2-yl, 6H-1,3-oxazin-4-yl,  
 6H-1,3-oxazin-5-yl, 6H-1,3-oxazin-6-yl, 6H-1,3-thiazin-2-yl,  
 6H-1,3-oxazin-4-yl, 6H-1,3-oxazin-5-yl, 6H-1,3-thiazin-6-yl,  
 2H-1,4-oxazin-2-yl, 2H-1,4-oxazin-3-yl, 2H-1,4-oxazin-5-yl,  
 40 2H-1,4-oxazin-6-yl, 2H-1,4-thiazin-2-yl, 2H-1,4-thiazin-3-yl,  
 2H-1,4-thiazin-5-yl, 2H-1,4-thiazin-6-yl, 4H-1,4-oxazin-2-yl,  
 4H-1,4-oxazin-3-yl, 4H-1,4-thiazin-2-yl, 4H-1,4-thiazin-3-yl,  
 1,4-dihydropyridazin-3-yl, 1,4-dihydropyridazin-4-yl,  
 1,4-dihydropyridazin-5-yl, 1,4-dihydropyridazin-6-yl,  
 45 1,4-dihydropyrazin-2-yl, 1,2-dihydropyrazin-2-yl,  
 1,2-dihydropyrazin-3-yl, 1,2-dihydropyrazin-5-yl,  
 1,2-dihydropyrazin-6-yl, 1,4-dihydropyrimidin-2-yl,

1,4-dihydropyrimidin-4-yl, 1,4-dihydropyrimidin-5-yl,  
 1,4-dihydropyrimidin-6-yl, 3,4-dihydropyrimidin-2-yl,  
 3,4-dihydropyrimidin-4-yl, 3,4-dihydropyrimidin-5-yl or  
 3,4-dihydropyrimidin-6-yl, pyridazin-3-yl, pyridazin-4-yl,  
 5 pyrimidin-2-yl, pyrimidin-4-yl, pyrimidin-5-yl or  
 pyrazin-2-yl;

6-membered rings having 3 hetero atoms such as, for example,

10 1,3,5-triazin-2-yl, 1,2,4-triazin-3-yl, 1,2,4-triazin-5-yl or  
 1,2,4-triazin-6-yl;

6-membered rings having 4 hetero atoms such as, for example,

15 1,2,4,5-tetrazin-3-yl;

where, if appropriate, the sulfur of the abovementioned heterocycles may be oxidized to S=O or S(=O)<sub>2</sub>;

20 and where a bicyclic ring system may be formed with a fused-on phenyl ring or with a C<sub>3</sub>-C<sub>6</sub>-carbocycle or with another 5- to 6-membered heterocycle.

25 - N-linked heterocyclyl: a saturated, partially saturated or unsaturated 5- or 6-membered heterocyclic ring which is attached via nitrogen and which contains at least one nitrogen and optionally one to three identical or different hetero atoms selected from the following group: oxygen,  
 30 sulfur or nitrogen, i.e., for example,

5-membered rings having 1 hetero atom which are linked by a nitrogen, such as, for example,

35 tetrahydropyrrol-1-yl, 2,3-dihydro-1H-pyrrol-1-yl,  
 2,5-dihydro-1H-pyrrol-1-yl or pyrrol-1-yl;

40 5-membered rings having 2 hetero atoms which are linked by a nitrogen such as, for example,

45 tetrahydropyrazol-1-yl, tetrahydroisoxazol-2-yl,  
 tetrahydroisothiazol-2-yl, tetrahydroimidazol-1-yl,  
 tetrahydrooxazol-3-yl, tetrahydrothiazol-3-yl,  
 4,5-dihydro-1H-pyrazol-1-yl, 2,5-dihydro-1H-pyrazol-1-yl,  
 2,3-dihydro-1H-pyrazol-1-yl, 2,5-dihydroisoxazol-  
 2-yl, 2,3-dihydroisoxazol-2-yl, 2,5-dihydroisothiazol-2-yl,

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2,3-dihydroisoxazol-2-yl, 4,5-dihydro-1H-imidazol-1-yl,  
 2,5-dihydro-1H-imidazol-1-yl, 2,3-dihydro-1H-imidazol-1-yl,  
 2,3-dihydrooxazol-3-yl, 2,3-dihydrothiazol-3-yl, pyrazol-1-yl  
 or imidazol-1-yl;

5

5-membered rings having 3 hetero atoms which are linked by a nitrogen such as, for example,

10 1,2,4- $\Delta^4$ -oxadiazolin-2-yl, 1,2,4- $\Delta^2$ -oxadiazolin-4-yl,  
 1,2,4- $\Delta^3$ -oxadiazolin-2-yl, 1,3,4- $\Delta^2$ -oxadiazolin-4-yl,  
 1,2,4- $\Delta^5$ -thiadiazolin-2-yl, 1,2,4- $\Delta^3$ -thiadiazolin-2-yl,  
 1,2,4- $\Delta^2$ -thiadiazolin-4-yl, 1,3,4- $\Delta^2$ -thiadiazolin-4-yl,  
 1,2,3- $\Delta^2$ -triazolin-1-yl, 1,2,4- $\Delta^2$ -triazolin-1-yl,  
 15 1,2,4- $\Delta^2$ -triazolin-4-yl, 1,2,4- $\Delta^3$ -triazolin-1-yl, 1,2,4- $\Delta^1$ -triazolin-4-yl, 1,2,3-triazol-1-yl or 1,2,4-triazol-1-yl;

20

5-membered rings having 4 hetero atoms which are linked by a nitrogen such as, for example,

25

tetrazol-1-yl;

25

and 6-membered rings having 1 hetero atom which are linked by a nitrogen, such as, for example

30

piperidin-1-yl, 1,2,3,4-tetrahydropyridin-1-yl,  
 1,2,5,6-tetrahydropyridin-1-yl, 1,4-dihydropyridin-1-yl or  
 1,2-dihydropyridin-1-yl;

35

6-membered rings having 2 hetero atoms which are linked by a nitrogen such as, for example,

35

hexahydropyrimidin-1-yl, hexahydropyrazin-1-yl,  
 hexahydropyridazin-1-yl, tetrahydro-1,3-oxazin-3-yl,  
 tetrahydro-1,3-thiazin-3-yl, tetrahydro-1,4-thiazin-4-yl,  
 tetrahydro-1,4-oxazin-4-yl, tetrahydro-1,2-oxazin-2-yl,  
 2H-5,6-dihydro-1,2-oxazin-2-yl,  
 2H-5,6-dihydro-1,2-thiazin-2-yl, 2H-3,6-dihydro-1,2-  
 40 oxazin-2-yl, 2H-3,6-dihydro-1,2-thiazin-oxazin-2-yl,  
 2H-3,4-dihydro-1,2-thiazin-2-yl, 2,3,4,5-tetrahydro-  
 pyridazin-2-yl, 1,2,5,6-tetrahydropyridazin-1-yl,  
 1,2,5,6-tetrahydropyridazin-2-yl, 1,2,3,6-tetrahydro-  
 pyridazin-1-yl, 3,4,5,6-tetrahydropyrimidin-3-yl,  
 45 1,2,3,4-tetrahydropyrazin-1-yl, 1,2,3,4-tetrahydro-  
 pyrimidin-1-yl, 1,2,3,4-tetrahydropyrimidin-3-yl,  
 2,3-dihydro-1,4-thiazin-4-yl, 2H-1,2-oxazin-2-yl,

2H-1,2-thiazin-2-yl, 4H-1,4-oxazin-4-yl, 4H-1,4-thiazin-4-yl,  
 1,4-dihydropyridazin-1-yl, 1,4-dihydropyrazin-1-yl,  
 1,2-dihydropyrazin-1-yl, 1,4-dihydropyrimidin-1-yl or  
 3,4-dihydropyrimidin-3-yl, and also cyclic imides which are  
 5 linked via nitrogen, such as:  
 phthalimide, tetrahydropthalimide, succinimide, maleimide or  
 glutarimide, and also 4-oxo-1,4-dihydropyridin-1-yl.

10 All phenyl rings or heterocyclyl radicals, and also all phenyl  
 components in phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 phenoxy, phenylthio, phenylcarbonyl, phenylalkenylcarbonyl,  
 phenoxy carbonyl, phenoxyalkylcarbonyl, phenylaminocarbonyl and  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-phenylaminocarbonyl or heterocyclyl components  
 in heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 15 heterocyclyloxy, heterocyclylthio, heterocyclylcarbonyl,  
 heterocyclylalkenylcarbonyl, heterocyclyloxyalkylcarbonyl,  
 heterocyclyloxycarbonyl, heterocyclylaminocarbonyl and  
 N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-heterocyclylaminocarbonyl are, unless stated  
 otherwise, preferably unsubstituted, or they carry one to three  
 20 halogen atoms and/or one nitro group, one cyano radical and/or  
 one or two methyl, trifluoromethyl, methoxy or trifluoromethoxy  
 substituents.

25 The compounds of the formula I according to the invention where R<sup>4</sup>  
 = IIa are referred to as compounds of the formula Ia, and  
 compounds of the formula I where R<sup>4</sup> = IIb are referred to as Ib.

The compounds of the formula I should be particularly emphasized,  
 where  
 30

R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl,  
 C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl,  
 C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl,  
 35 C<sub>2</sub>-C<sub>6</sub>-alkynylcarbonyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkylcarbonyl,  
 C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkenylloxycarbonyl,  
 C<sub>3</sub>-C<sub>6</sub>-alkynyloxy carbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylthiocarbonyl,  
 C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkenylaminocarbonyl,  
 C<sub>3</sub>-C<sub>6</sub>-alkynylaminocarbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-  
 40 aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-  
 aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-  
 aminocarbonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-  
 aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-  
 aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-  
 aminocarbonyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminothiocarbonyl,  
 45 C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyimino-  
 C<sub>1</sub>-C<sub>6</sub>-alkyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl or  
 N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl, where the

## 36

alkyl, cycloalkyl and alkoxy radicals mentioned may be partially or fully halogenated and/or may carry one to three of the following groups:

5 cyano,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -alkylthio, di-( $C_1$ - $C_4$ -alkyl)-amino,  $C_1$ - $C_4$ -alkylcarbonyl,  $C_1$ - $C_4$ -alkoxycarbonyl,

$C_1$ - $C_4$ -alkoxy- $C_1$ - $C_4$ -alkoxycarbonyl, di-( $C_1$ - $C_4$ -alkyl)-amino- $C_1$ - $C_4$ -alkoxycarbonyl, hydroxycarbonyl,

$C_1$ - $C_4$ -alkylaminocarbonyl,

di-( $C_1$ - $C_4$ -alkyl)aminocarbonyl, aminocarbonyl,

10  $C_1$ - $C_4$ -alkylcarbonyloxy or  $C_3$ - $C_6$ -cycloalkyl;

phenyl, heterocyclyl, phenyl- $C_1$ - $C_6$ -alkyl, heterocyclyl- $C_1$ - $C_6$ -alkyl, phenylcarbonyl- $C_1$ - $C_6$ -alkyl, heterocyclyl-carbonyl- $C_1$ - $C_6$ -alkyl, phenylcarbonyl, heterocyclyl-carbonyl, phenoxy carbonyl, heterocyclyl oxycarbonyl,

15 phenoxythiocarbonyl, heterocyclyl oxythiocarbonyl, phenoxy- $C_1$ - $C_6$ -alkylcarbonyl, heterocyclyl oxy- $C_1$ - $C_6$ -alkylcarbonyl, phenylaminocarbonyl,  $N$ -( $C_1$ - $C_6$ -alkyl)-

$N$ -(phenyl)aminocarbonyl, heterocyclylaminocarbonyl,  $N$ -( $C_1$ - $C_6$ -alkyl)- $N$ -(heterocyclyl)aminocarbonyl,

20 phenyl- $C_2$ - $C_6$ -alkenylcarbonyl or heterocyclyl- $C_2$ - $C_6$ -alkenylcarbonyl, where the phenyl and the heterocyclyl radical of the 20 last-mentioned

substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

25 nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

30 With a view to the use of the compounds of the formula I according to the invention as herbicides, the variables preferably have the following meanings, in each case on their own or in combination:

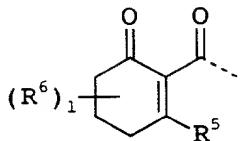
35  $R^1$  is nitro, halogen,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkylthio,  $C_1$ - $C_6$ -haloalkylthio,  $C_1$ - $C_6$ -alkylsulfonyl or  $C_1$ - $C_6$ -haloalkylsulfonyl;

40  $R^2$ ,  $R^3$  are hydrogen,  $C_1$ - $C_6$ -alkyl or halogen;

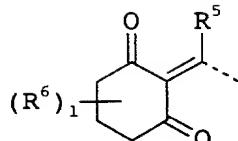
$R^4$  is a compound of IIa or IIb

45

5



IIa



IIb

where

10

$R^5$  is halogen,  $OR^7$ ,  $SR^7$ ,  $SO_2R^8$ ,  $OSO_2R^8$ ,  $OPOR^8R^9$ ,  $OPR^8R^9$ ,  $OPSR^8R^9$ ,  $NR^{10}R^{11}$ ,  $ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl), where the heterocyclyl radical of the two last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals: nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

15

20

25

30 or

two radicals  $R^6$ , which are linked to the same carbon, together form an  $-O-(CH_2)_m-O-$ ,  $-O-(CH_2)_m-S-$ ,  $-S-(CH_2)_m-S-$ ,  $-O-(CH_2)_n-$  or  $-S-(CH_2)_n-$  chain which may be substituted by one to three radicals from the following group:

35

halogen, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl or  $C_1$ - $C_4$ -alkoxycarbonyl;

40

or

two radicals  $R^6$ , which are linked to the same carbon, together form a  $-(CH_2)_p$  chain which may be interrupted by oxygen or sulfur and/or may be substituted by one to four radicals from the following group:

45

halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

5

two radicals R<sup>6</sup>, which are linked to the same carbon, together with this carbon form a carbonyl group;

or

10 two radicals R<sup>6</sup>, which are linked to different carbons, together form a -(CH<sub>2</sub>)<sub>n</sub> chain which may be substituted by one to three radicals from the following group:

15 halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, hydroxyl or C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl;

R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl, C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkenyloxy carbonyl, C<sub>3</sub>-C<sub>6</sub>-alkynylloxy carbonyl, (C<sub>1</sub>-C<sub>20</sub>-alkylthio)carbonyl (particularly preferably (C<sub>1</sub>-C<sub>6</sub>-alkylthio)carbonyl), C<sub>1</sub>-C<sub>6</sub>-alkylaminocarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkenylaminocarbonyl, C<sub>3</sub>-C<sub>6</sub>-alkynylaminocarbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)-N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkenyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl, N-(C<sub>3</sub>-C<sub>6</sub>-alkynyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)aminocarbonyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminothiocarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyimino-C<sub>1</sub>-C<sub>6</sub>-alkyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl or N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkylamino)imino-C<sub>1</sub>-C<sub>6</sub>-alkyl, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three of the following groups:

40 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl, hydroxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

45 phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, heterocyclylcarbonyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenylcarbonyl,

heterocyclylcarbonyl, phenoxy carbonyl,  
 heterocyclyloxycarbonyl, phenoxythiocarbonyl,  
 heterocyclyloxythiocarbonyl,  
 phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
 5 heterocyclyloxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
 phenyl-C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl or  
 heterocyclyl-C<sub>2</sub>-C<sub>6</sub>-alkenylcarbonyl, where the phenyl  
 and the heterocyclyl radical of the 16 last mentioned  
 10 substituents may be partially or fully halogenated  
 and/or may carry one to three of the following  
 radicals:  
 nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy  
 or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

15 R<sup>8</sup>, R<sup>9</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl,  
 C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, hydroxy, C<sub>1</sub>-C<sub>6</sub>-alkoxy,  
 di-C<sub>1</sub>-C<sub>6</sub>-alkylamino, or di-(C<sub>1</sub>-C<sub>6</sub>-haloalkyl)amino,  
 where the abovementioned alkyl, cycloalkyl and alkoxy  
 20 radicals may be partially or fully halogenated and/or  
 may carry one to three of the following groups:  
 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio,  
 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl,  
 hydroxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl,  
 25 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;  
 phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, phenoxy, heterocyclyloxy,  
 where the phenyl- and the heterocyclyl radical of the  
 30 last-mentioned substituents may be partially or fully  
 halogenated and/or may carry one to three of the  
 following radicals:  
 nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy  
 or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

35 R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl,  
 C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>3</sub>-C<sub>6</sub>-alkenyloxy or  
 di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino, where the abovementioned alkyl,  
 40 cycloalkyl and alkoxy radicals may be partially or  
 fully halogenated and/or may carry one to three  
 radicals from the following group:

cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio,  
 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl,  
 hydroxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl,  
 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

5

phenyl, heterocyclyl, phenyl-C<sub>1</sub>-C<sub>6</sub>-alkyl or  
 heterocyclyl-C<sub>1</sub>-C<sub>6</sub>-alkyl, where the phenyl or  
 heterocyclyl radical of the four last-mentioned  
 10 substituents may be partially or fully halogenated  
 and/or may carry one to three of the following  
 radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy  
 or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

15

R<sup>11</sup>, R<sup>12</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>3</sub>-C<sub>6</sub>-alkenyl;

l 0 to 6;

20 m 2 to 4;

n 1 to 5;

25 p 2 to 5.

Particular preference is given to compounds of the formula I  
 where the variables have the following meanings, either on their  
 own or in combination:

30

R<sup>1</sup> is halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy,  
 C<sub>1</sub>-C<sub>6</sub>-alkylthio or C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl;

35 in particular halogen, such as fluorine or chlorine,  
 C<sub>1</sub>-C<sub>6</sub>-alkyl, such as methyl or ethyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl,  
 such as difluoromethyl or trifluoromethyl;  
 particularly preferably fluorine, chlorine, methyl,  
 difluoromethyl or trifluoromethyl;

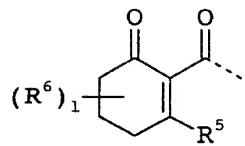
40 R<sup>2</sup> is hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl, such as methyl or ethyl;  
 in particular hydrogen or methyl;

R<sup>3</sup> is hydrogen or C<sub>1</sub>-C<sub>6</sub>-alkyl; in particular hydrogen;

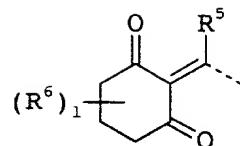
45 R<sup>4</sup> is a compound IIa or IIb

41

5



IIa



IIb

where

10

$R^5$  is halogen,  $OR^7$ ,  $SR^7$ ,  $SO_2R^8$ ,  $OSO_2R^8$ ,  $NR^{10}R^{11}$ ,  $ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl), where the heterocyclyl radical of the two last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

15

nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

20

$R^6$  is halogen, cyano,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl, di-( $C_1$ - $C_6$ -alkoxy)methyl, di-( $C_1$ - $C_6$ -alkylthio)methyl, ( $C_1$ - $C_6$ -alkoxy)( $C_1$ - $C_6$ -alkylthio)methyl, hydroxyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkoxycarbonyloxy,  $C_1$ - $C_6$ -alkylthio or  $C_1$ - $C_6$ -haloalkylthio;

25

or

30

two radicals  $R^6$ , which are linked to the same carbon, together with this carbon form a carbonyl group;

35

$R^7$  is  $C_1$ - $C_6$ -alkyl,  $C_3$ - $C_6$ -alkenyl,  $C_3$ - $C_6$ -haloalkenyl,  $C_3$ - $C_6$ -alkynyl,  $C_1$ - $C_{20}$ -alkylcarbonyl,  $C_3$ - $C_6$ -cycloalkylcarbonyl,  $C_1$ - $C_6$ -alkoxycarbonyl,  $C_3$ - $C_6$ -alkenyloxy carbonyl,  $C_1$ - $C_6$ -alkylaminocarbonyl,  $C_3$ - $C_6$ -alkenylaminocarbonyl, N,N-di-( $C_1$ - $C_6$ -alkyl)aminocarbonyl, N-( $C_3$ - $C_6$ -alkenyl)-N-( $C_1$ - $C_6$ -alkyl)aminocarbonyl, N-( $C_1$ - $C_6$ -alkoxy)-N-( $C_1$ - $C_6$ -alkyl)aminocarbonyl, N-( $C_3$ - $C_6$ -alkenyl)-N-( $C_1$ - $C_6$ -alkoxy)aminocarbonyl, di-( $C_1$ - $C_6$ -alkyl)aminothiocarbonyl or  $C_1$ - $C_6$ -alkylcarbonyl- $C_1$ - $C_6$ -alkyl, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated and/or may carry one to three of the following groups:

40

45

cyano,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -alkylthio,  
 $C_1$ - $C_4$ -alkylcarbonyl,  $C_1$ - $C_4$ -alkoxycarbonyl,  
hydroxycarbonyl, di-( $C_1$ - $C_4$ -alkyl)aminocarbonyl,  
 $C_1$ - $C_4$ -alkylcarbonyloxy or  $C_3$ - $C_6$ -cycloalkyl;

5

phenyl, heterocyclyl, phenyl- $C_1$ - $C_6$ -alkyl,  
heterocyclyl- $C_1$ - $C_6$ -alkyl, phenylcarbonyl- $C_1$ - $C_6$ -alkyl,

heterocyclylcarbonyl- $C_1$ - $C_6$ -alkyl, phenylcarbonyl,

heterocyclylcarbonyl, phenoxy carbonyl,

10

heterocyclylloxy carbonyl, phenoxythiocarbonyl,

heterocyclylloxythiocarbonyl,

phenoxy- $C_1$ - $C_6$ -alkylcarbonyl or

heterocyclylloxy- $C_1$ - $C_6$ -alkylcarbonyl, where the phenyl

15

and the heterocyclyl radical of the 14 last-mentioned  
substituents may be partially or fully halogenated  
and/or may carry one to three of the following  
radicals:

20

nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy  
or  $C_1$ - $C_4$ -haloalkoxy;

R<sup>8</sup>

is  $C_1$ - $C_6$ -alkyl,  $C_3$ - $C_6$ -alkenyl,  $C_3$ - $C_6$ -haloalkenyl,  
 $C_3$ - $C_6$ -cycloalkyl, hydroxyl,  $C_1$ - $C_6$ -alkoxy,

di- $C_1$ - $C_6$ -alkylamino or di-( $C_1$ - $C_6$ -haloalkyl)amino, where  
the abovementioned alkyl, cycloalkyl and alkoxy  
radicals may be partially or fully halogenated and/or  
may carry one to three of the following groups:

cyano,  $C_1$ - $C_4$ -alkoxy,  $C_1$ - $C_4$ -alkylthio,

$C_1$ - $C_4$ -alkylcarbonyl,  $C_1$ - $C_4$ -alkoxycarbonyl,

30

hydroxycarbonyl, di-( $C_1$ - $C_4$ -alkyl)aminocarbonyl,  
 $C_1$ - $C_4$ -alkylcarbonyloxy or  $C_3$ - $C_6$ -cycloalkyl;

35

phenyl, heterocyclyl, phenyl- $C_1$ - $C_6$ -alkyl,

heterocyclyl- $C_1$ - $C_6$ -alkyl, phenoxy, heterocyclylloxy,

where the phenyl and the heterocyclyl radical of the  
last-mentioned substituents may be partially or fully  
halogenated and/or may carry one to three of the  
following radicals:

40

nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy  
or  $C_1$ - $C_4$ -haloalkoxy;

R<sup>10</sup>

is  $C_1$ - $C_6$ -alkyl,  $C_3$ - $C_6$ -alkenyl,  $C_3$ - $C_6$ -haloalkenyl,  
 $C_3$ - $C_6$ -cycloalkyl,  $C_1$ - $C_6$ -alkoxy,  $C_3$ - $C_6$ -alkenyloxy or

45

di-( $C_1$ - $C_6$ -alkyl)amino, where the abovementioned alkyl,  
cycloalkyl and alkoxy radicals may be partially or

## 43

fully halogenated and/or may carry one to three radicals from the following group:  
 cyano, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio,  
 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl,  
 hydroxycarbonyl, di-(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl,  
 C<sub>1</sub>-C<sub>4</sub>-alkylcarbonyloxy or C<sub>3</sub>-C<sub>6</sub>-cycloalkyl;

5

10

15

R<sup>11</sup>, R<sup>12</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>3</sub>-C<sub>6</sub>-alkenyl;

20

l is 0 to 6.

Particular preference is also given to the compounds of the formula I where the variables have the following meaning, on their own or in combination:

25

R<sup>1</sup> is halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, heterocyclyloxy or phenylthio, where the two last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the substituents mentioned below:

30

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;  
 particularly preferably halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-alkylthio;

35

R<sup>2</sup> is hydrogen, C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-haloalkyl;  
 particularly preferably hydrogen;

R<sup>3</sup> is hydrogen;

40

R<sup>5</sup> is halogen, OR<sup>7</sup>, SR<sup>7</sup>, SOR<sup>8</sup>, SO<sub>2</sub>R<sup>8</sup>, OSO<sub>2</sub>R<sup>8</sup>, OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup>, OPSR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals:

45

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;  
 particularly preferably halogen, OR<sup>7</sup>, NR<sup>10</sup>R<sup>11</sup> or

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N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;  
 5 particularly preferably fluorine, OR<sup>7</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocyclyl selected from the group consisting of 4-morpholinyl or 4-oxo-1,4-dihydro-pyrid-1-yl;

10 R<sup>6</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl or two radicals R<sup>6</sup> which are attached to the same carbon form, together with this carbon, a carbonyl group;

15 R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy-carbonyl, (C<sub>1</sub>-C<sub>20</sub>-alkylthio)carbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, phenyl, phenylcarbonyl or phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, where the phenyl radical of the three last-mentioned  
 20 substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;  
 25 particularly preferably C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-alkyl-carbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkylthio)-carbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, phenyl, phenylcarbonyl or phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, where the phenyl radical of the three last-mentioned  
 30 substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:

nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;  
 35 particularly preferably C<sub>1</sub>-C<sub>20</sub>-alkylthiocarbonyl; most preferably C<sub>1</sub>-C<sub>6</sub>-alkylthiocarbonyl;

40 R<sup>8</sup>, R<sup>9</sup> are C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)amino or phenyl, where the last-mentioned radical may be partially or fully halogenated and/or may carry one to three of the following radicals:  
 nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

45 R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-alkoxy;

11 R<sup>11</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl;

1 is from 0 to 6;  
particularly preferably from 4 to 6;  
5 in particular 6.

Particular preference is also given to compounds of the formula I where

10 R<sup>6</sup> is nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)methyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyloxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, 15 C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl or C<sub>1</sub>-C<sub>6</sub>-haloalkoxycarbonyl;

20 or

two radicals R<sup>6</sup>, which are linked to the same carbon, together 25 form an -O-(CH<sub>2</sub>)<sub>m</sub>-O-, -O-(CH<sub>2</sub>)<sub>m</sub>-O-, -O-(CH<sub>2</sub>)<sub>m</sub>-S-, -S-(CH<sub>2</sub>)<sub>m</sub>-S-, -O-(CH<sub>2</sub>)<sub>n</sub>- or -S-(CH<sub>2</sub>)<sub>n</sub> chain which may be substituted by one to three radicals from the following group:  
halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or 30 C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

two radicals R<sup>6</sup>, which are linked to the same carbon, form a 35 -(CH<sub>2</sub>)<sub>p</sub> chain which may be interrupted by oxygen or sulfur and/or which may be substituted by one to four radicals from the following group:  
halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

40

or

two radicals R<sup>6</sup>, which are linked to the same carbon, together 45 with this carbon form a carbonyl group.

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Particular preference is given to compounds of the formula I where

5       $R^6$       is nitro, halogen, cyano,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl, di-( $C_1$ - $C_6$ -alkoxy)methyl, di-( $C_1$ - $C_6$ -alkylthio)methyl, ( $C_1$ - $C_6$ -alkoxy)( $C_1$ - $C_6$ -alkylthio)methyl, hydroxyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $C_1$ - $C_6$ -alkoxycarbonyloxy,  $C_1$ - $C_6$ -alkylthio,  $C_1$ - $C_6$ -haloalkylthio,  $C_1$ - $C_6$ -alkylsulfinyl,  $C_1$ - $C_6$ -haloalkylsulfinyl,  $C_1$ - $C_6$ -alkylsulfonyl,  $C_1$ - $C_6$ -haloalkylsulfonyl,  $C_1$ - $C_6$ -alkylcarbonyl,  $C_1$ - $C_6$ -haloalkylcarbonyl,  $C_1$ - $C_6$ -alkoxycarbonyl or  $C_1$ - $C_6$ -haloalkoxycarbonyl;

10

15      or

two radicals  $R^6$ , which are linked to the same carbon, together with this carbon form a carbonyl group.

20 Particular preference is also given to the compounds of the formula I where

25       $R^5$       is halogen or ( $C_1$ - $C_{20}$ -alkylthio)carbonyloxy; particularly preferably fluorine or ( $C_1$ - $C_6$ -alkylthio)carbonyloxy;

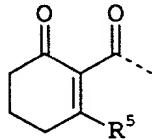
Particular preference is also given to the compounds of the formula I where

30       $R^5$       is  $NR^{10}R^{11}$  or N-linked heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals: nitro, cyano,  $C_1$ - $C_4$ -alkyl,  $C_1$ - $C_4$ -haloalkyl,  $C_1$ - $C_4$ -alkoxy or  $C_1$ - $C_4$ -haloalkoxy;

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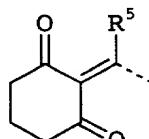
Particular preference is also given to the compounds of the formula I where  $R^4$  has the following meanings:

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45

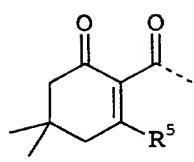
IIa1



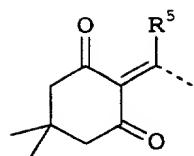
IIb1

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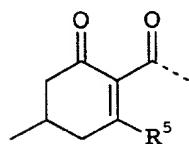


IIIa2

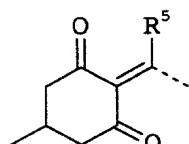


IIIb2

10



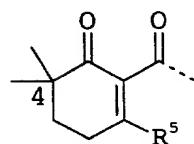
IIIa3



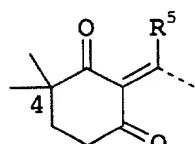
IIIb3

15

20



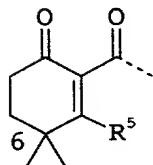
IIIa4



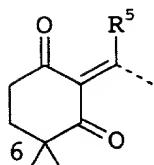
IIIb4

25

30



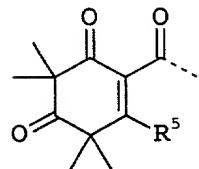
IIIa5



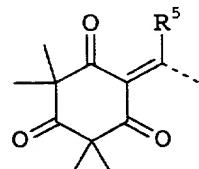
IIIb5

35

40

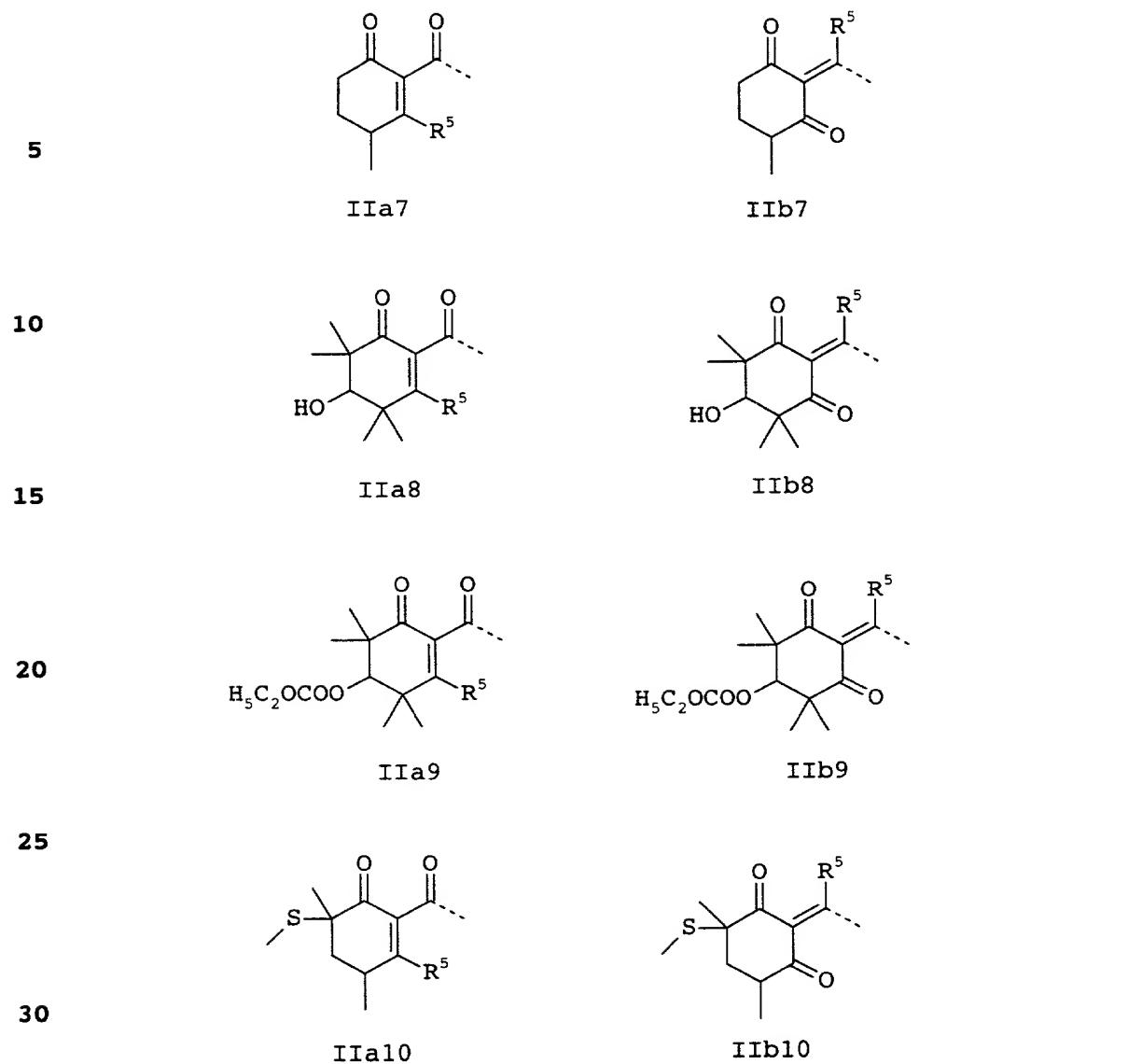


IIIa6



IIIb6

45



Very particular preference is given to the compounds of the formula I where

35

$R^5$  is  $NR^{10}R^{11}$  or tetrahydropyrrol-1-yl,  
 2,3-dihydro-1H-pyrrol-1-yl, 2,5-dihydro-1H-pyrrol-1-yl,  
 pyrrol-1-yl, tetrahydropyrazol-1-yl,  
 tetrahydroisoxazol-2-yl, tetrahydrothiazol-2-yl,  
 tetrahydroimidazol-1-yl, tetrahydroooxazol-3-yl,  
 tetrahydrothiazol-3-yl, pyrazol-1-yl, imidazol-1-yl,  
 1,2,4-triazol-1-yl, tetrazol-1-yl, piperidin-1-yl,  
 4-oxo-1,4-dihydro-1-pyridyl, hexahydropyrimidin-1-yl,  
 hexahydropyrazin-1-yl, tetrahydro-1,4-oxazin-4-yl,  
 tetrahydro-1,2-oxazin-2-yl, succinimide, maleimide or

45

glutarimide, where the abovementioned heterocycles may be partially or fully halogenated and/or may carry one to three of the following radicals:

$R^{10}$  C<sub>1</sub>-C<sub>6</sub>-alkoxy

Extraordinary preference is given to compounds of the formula Ia1 and Ib1 (= I where l = 0), in particular to the compounds Ia1.1 to Ia1.456 and the compounds Ib1.1 to Ib1.456, where the radical definitions R<sup>1</sup> to R<sup>5</sup> and l have a preferred meaning for the compounds according to the invention not only in combination with each other, but in each case also on their own.

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Table 1:

5					
10	Ia1	Ib1			
15	No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ia1.1 or Ib1.1	CH <sub>3</sub>	H	H		F
Ia1.2 or Ib1.2	CH <sub>3</sub>	H	H		Cl
Ia1.3 or Ib1.3	CH <sub>3</sub>	H	H		Br
Ia1.4 or Ib1.4	CH <sub>3</sub>	H	H		I
Ia1.5 or Ib1.5	CH <sub>3</sub>	H	H		SCH <sub>3</sub>
Ia1.6 or Ib1.6	CH <sub>3</sub>	H	H		SCH <sub>2</sub> CH <sub>3</sub>
Ia1.7 or Ib1.7	CH <sub>3</sub>	H	H		SCO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ia1.8 or Ib1.8	CH <sub>3</sub>	H	H		SO <sub>2</sub> CH <sub>3</sub>
Ia1.9 or Ib1.9	CH <sub>3</sub>	H	H		SO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ia1.10 or Ib1.10	CH <sub>3</sub>	H	H		SC <sub>6</sub> H <sub>5</sub>
Ia1.11 or Ib1.11	CH <sub>3</sub>	H	H		S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ia1.12 or Ib1.12	CH <sub>3</sub>	H	H		S(4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ia1.13 or Ib1.13	CH <sub>3</sub>	H	H		SO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ia1.14 or Ib1.14	CH <sub>3</sub>	H	H		SO <sub>2</sub> (4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ia1.15 or Ib1.15	CH <sub>3</sub>	H	H		SO <sub>2</sub> (4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ia1.16 or Ib1.16	CH <sub>3</sub>	H	H		4-morpholiny
Ia1.17 or Ib1.17	CH <sub>3</sub>	H	H		1-pyrrolidinyl
Ia1.18 or Ib1.18	CH <sub>3</sub>	H	H		1-(1,2,4-triazolyl)
Ia1.19 or Ib1.19	CH <sub>3</sub>	H	H		1-imidazolyl
Ia1.20 or Ib1.20	CH <sub>3</sub>	H	H		1-pyrazolyl
Ia1.21 or Ib1.21	CH <sub>3</sub>	H	H		4-oxo-1,4-dihydro-1-pyridyl
Ia1.22 or Ib1.22	CH <sub>3</sub>	H	H		N(OCH <sub>3</sub> )CH <sub>3</sub>
Ia1.23 or Ib1.23	CH <sub>3</sub>	H	H		2-tetrahydroisoxazolyl
Ia1.24 or Ib1.24	CH <sub>3</sub>	H	H		N(CH <sub>3</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ia1.25 or Ib1.25	CH <sub>3</sub>	H	H		N(CH <sub>2</sub> CH=CH <sub>2</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ia1.26 or Ib1.26	CH <sub>3</sub>	H	H		OPO(OCH <sub>3</sub> ) <sub>2</sub>
Ia1.27 or Ib1.27	CH <sub>3</sub>	H	H		OPO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ia1.28 or Ib1.28	CH <sub>3</sub>	H	H		OPO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ia1.29 or Ib1.29	CH <sub>3</sub>	H	H		OPO(OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.30 or Ib1.30	CH <sub>3</sub>	H	H	OPO(CH <sub>3</sub> ) <sub>2</sub>
Ial.31 or Ib1.31	CH <sub>3</sub>	H	H	OPO(CH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.32 or Ib1.32	CH <sub>3</sub>	H	H	OPO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.33 or Ib1.33	CH <sub>3</sub>	H	H	OPS(OCH <sub>3</sub> ) <sub>2</sub>
Ial.34 or Ib1.34	CH <sub>3</sub>	H	H	OPS(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.35 or Ib1.35	CH <sub>3</sub>	H	H	OP(OCH <sub>3</sub> ) <sub>2</sub>
Ial.36 or Ib1.36	CH <sub>3</sub>	H	H	OP(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.37 or Ib1.37	CH <sub>3</sub>	H	H	PO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.38 or Ib1.38	CH <sub>3</sub>	H	H	PO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.39 or Ib1.39	CH <sub>3</sub>	H	H	PO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.40 or Ib1.40	CH <sub>3</sub>	H	H	OCH <sub>3</sub>
Ial.41 or Ib1.41	CH <sub>3</sub>	H	H	OCH <sub>2</sub> CH <sub>3</sub>
Ial.42 or Ib1.42	CH <sub>3</sub>	H	H	OCH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.43 or Ib1.43	CH <sub>3</sub>	H	H	OCH <sub>2</sub> (2-furyl)
Ial.44 or Ib1.44	CH <sub>3</sub>	H	H	OCH <sub>2</sub> (3-furyl)
Ial.45 or Ib1.45	CH <sub>3</sub>	H	H	OCOOCH <sub>3</sub>
Ial.46 or Ib1.46	CH <sub>3</sub>	H	H	OCOOCH <sub>2</sub> CH <sub>3</sub>
Ial.47 or Ib1.47	CH <sub>3</sub>	H	H	OCOOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.48 or Ib1.48	CH <sub>3</sub>	H	H	OCOOC <sub>6</sub> H <sub>5</sub>
Ial.49 or Ib1.49	CH <sub>3</sub>	H	H	OCOOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.50 or Ib1.50	CH <sub>3</sub>	H	H	OCSOC <sub>6</sub> H <sub>5</sub>
Ial.51 or Ib1.51	CH <sub>3</sub>	H	H	OCSN(CH <sub>3</sub> ) <sub>2</sub>
Ial.52 or Ib1.52	CH <sub>3</sub>	H	H	OCON(CH <sub>3</sub> ) <sub>2</sub>
Ial.53 or Ib1.53	CH <sub>3</sub>	H	H	OCOSCH <sub>3</sub>
Ial.54 or Ib1.54	CH <sub>3</sub>	H	H	ON(CH <sub>3</sub> ) <sub>2</sub>
Ial.55 or Ib1.55	CH <sub>3</sub>	H	H	O-1-piperidyl
Ial.56 or Ib1.56	CH <sub>3</sub>	H	H	OCOCH <sub>3</sub>
Ial.57 or Ib1.57	CH <sub>3</sub>	H	H	OCOCH <sub>2</sub> CH <sub>3</sub>
Ial.58 or Ib1.58	CH <sub>3</sub>	H	H	OCOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.59 or Ib1.59	CH <sub>3</sub>	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.60 or Ib1.60	CH <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>6</sub> CH <sub>3</sub>
Ial.61 or Ib1.61	CH <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>7</sub> CH <sub>3</sub>
Ial.62 or Ib1.62	CH <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>16</sub> CH <sub>3</sub>
Ial.63 or Ib1.63	CH <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>14</sub> CH <sub>3</sub>
Ial.64 or Ib1.64	CH <sub>3</sub>	H	H	OCOCH <sub>2</sub> CH <sub>2</sub> CH=CH <sub>2</sub>
Ial.65 or Ib1.65	CH <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>3</sub> O(2,4-Cl <sub>2</sub> -C <sub>6</sub> H <sub>3</sub> )
Ial.66 or Ib1.66	CH <sub>3</sub>	H	H	OCOCH(CH <sub>3</sub> )O-(2-CH <sub>3</sub> -4-Cl-C <sub>6</sub> H <sub>3</sub> )
Ial.67 or Ib1.67	CH <sub>3</sub>	H	H	OCOCyclopropyl
Ial.68 or Ib1.68	CH <sub>3</sub>	H	H	OCOCyclopentyl
Ial.69 or Ib1.69	CH <sub>3</sub>	H	H	OCOCyclohexyl
Ial.70 or Ib1.70	CH <sub>3</sub>	H	H	OCOC <sub>6</sub> H <sub>5</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ia1.71 or Ib1.71	CH <sub>3</sub>	H	H	OCO(2-tetrahydrofuryl)
Ia1.72 or Ib1.72	CH <sub>3</sub>	H	H	OCO(2-furyl)
Ia1.73 or Ib1.73	CH <sub>3</sub>	H	H	OCO(2-thienyl)
Ia1.74 or Ib1.74	CH <sub>3</sub>	H	H	OCO(3-pyridyl)
Ia1.75 or Ib1.75	CH <sub>3</sub>	H	H	OSO <sub>2</sub> CH <sub>3</sub>
Ia1.76 or Ib1.76	CH <sub>3</sub>	H	H	OSO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ia1.77 or Ib1.77	F	H	H	F
Ia1.78 or Ib1.78	F	H	H	Cl
Ia1.79 or Ib1.79	F	H	H	Br
Ia1.80 or Ib1.80	F	H	H	I
Ia1.81 or Ib1.81	F	H	H	SCH <sub>3</sub>
Ia1.82 or Ib1.82	F	H	H	SCH <sub>2</sub> CH <sub>3</sub>
Ia1.83 or Ib1.83	F	H	H	SCO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ia1.84 or Ib1.84	F	H	H	SO <sub>2</sub> CH <sub>3</sub>
Ia1.85 or Ib1.85	F	H	H	SO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ia1.86 or Ib1.86	F	H	H	SC <sub>6</sub> H <sub>5</sub>
Ia1.87 or Ib1.87	F	H	H	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ia1.88 or Ib1.88	F	H	H	S(4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ia1.89 or Ib1.89	F	H	H	SO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ia1.90 or Ib1.90	F	H	H	SO <sub>2</sub> (4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ia1.91 or Ib1.91	F	H	H	SO <sub>2</sub> (4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ia1.92 or Ib1.92	F	H	H	4-morpholinyl
Ia1.93 or Ib1.93	F	H	H	1-pyrrolidinyl
Ia1.94 or Ib1.94	F	H	H	1-(1,2,4-triazolyl)
Ia1.95 or Ib1.95	F	H	H	1-imidazolyl
Ia1.96 or Ib1.96	F	H	H	1-pyrazolyl
Ia1.97 or Ib1.97	F	H	H	4-oxo-1,4-dihydro-1-pyridyl
Ia1.98 or Ib1.98	F	H	H	N(OCH <sub>3</sub> )CH <sub>3</sub>
Ia1.99 or Ib1.99	F	H	H	2-tetrahydroisoxazolyl
Ia1.100 or Ib1.100	F	H	H	N(CH <sub>3</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ia1.101 or Ib1.101	F	H	H	N(CH <sub>2</sub> CH=CH <sub>2</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ia1.102 or Ib1.102	F	H	H	OPO(OCH <sub>3</sub> ) <sub>2</sub>
Ia1.103 or Ib1.103	F	H	H	OPO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ia1.104 or Ib1.104	F	H	H	OPO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ia1.105 or Ib1.105	F	H	H	OPO(OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ia1.106 or Ib1.106	F	H	H	OPO(CH <sub>3</sub> ) <sub>2</sub>
Ia1.107 or Ib1.107	F	H	H	OPO(CH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ia1.108 or Ib1.108	F	H	H	OPO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ia1.109 or Ib1.109	F	H	H	OPS(OCH <sub>3</sub> ) <sub>2</sub>
Ia1.110 or Ib1.110	F	H	H	OPS(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ia1.111 or Ib1.111	F	H	H	OP(OCH <sub>3</sub> ) <sub>2</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.112 or Ib1.112	F	H	H	OP(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.113 or Ib1.113	F	H	H	PO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.114 or Ib1.114	F	H	H	PO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.115 or Ib1.115	F	H	H	PO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.116 or Ib1.116	F	H	H	OCH <sub>3</sub>
Ial.117 or Ib1.117	F	H	H	OCH <sub>2</sub> CH <sub>3</sub>
Ial.118 or Ib1.118	F	H	H	OCH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.119 or Ib1.119	F	H	H	OCH <sub>2</sub> (2-furyl)
Ial.120 or Ib1.120	F	H	H	OCH <sub>2</sub> (3-furyl)
Ial.121 or Ib1.121	F	H	H	OCOOCH <sub>3</sub>
Ial.122 or Ib1.122	F	H	H	OCOOCH <sub>2</sub> CH <sub>3</sub>
Ial.123 or Ib1.123	F	H	H	OCOOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.124 or Ib1.124	F	H	H	OCOOC <sub>6</sub> H <sub>5</sub>
Ial.125 or Ib1.125	F	H	H	OCOOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.126 or Ib1.126	F	H	H	OCSOC <sub>6</sub> H <sub>5</sub>
Ial.127 or Ib1.127	F	H	H	OCSN(CH <sub>3</sub> ) <sub>2</sub>
Ial.128 or Ib1.128	F	H	H	OCON(CH <sub>3</sub> ) <sub>2</sub>
Ial.129 or Ib1.129	F	H	H	OCOSCH <sub>3</sub>
Ial.130 or Ib1.130	F	H	H	ON(CH <sub>3</sub> ) <sub>2</sub>
Ial.131 or Ib1.131	F	H	H	O-1-piperidyl
Ial.132 or Ib1.132	F	H	H	OCOCH <sub>3</sub>
Ial.133 or Ib1.133	F	H	H	OCOCH <sub>2</sub> CH <sub>3</sub>
Ial.134 or Ib1.134	F	H	H	OCOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.135 or Ib1.135	F	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.136 or Ib1.136	F	H	H	OCO(CH <sub>2</sub> ) <sub>6</sub> CH <sub>3</sub>
Ial.137 or Ib1.137	F	H	H	OCO(CH <sub>2</sub> ) <sub>7</sub> CH <sub>3</sub>
Ial.138 or Ib1.138	F	H	H	OCO(CH <sub>2</sub> ) <sub>16</sub> CH <sub>3</sub>
Ial.139 or Ib1.139	F	H	H	OCO(CH <sub>2</sub> ) <sub>14</sub> CH <sub>3</sub>
Ial.140 or Ib1.140	F	H	H	OCOCH <sub>2</sub> CH <sub>2</sub> CH=CH <sub>2</sub>
Ial.141 or Ib1.141	F	H	H	OCO(CH <sub>2</sub> ) <sub>3</sub> O(2,4-Cl <sub>2</sub> -C <sub>6</sub> H <sub>3</sub> )
Ial.142 or Ib1.142	F	H	H	OCOCH(CH <sub>3</sub> )O-(2-CH <sub>3</sub> -4-Cl-C <sub>6</sub> H <sub>3</sub> )
Ial.143 or Ib1.143	F	H	H	OCOcyclopropyl
Ial.144 or Ib1.144	F	H	H	OCOcyclopentyl
Ial.145 or Ib1.145	F	H	H	OCOcyclohexyl
Ial.146 or Ib1.146	F	H	H	OCOC <sub>6</sub> H <sub>5</sub>
Ial.147 or Ib1.147	F	H	H	OCO(2-tetrahydrofuryl)
Ial.148 or Ib1.148	F	H	H	OCO(2-furyl)
Ial.149 or Ib1.149	F	H	H	OCO(2-thienyl)
Ial.150 or Ib1.150	F	H	H	OCO(3-pyridyl)
Ial.151 or Ib1.151	F	H	H	OSO <sub>2</sub> CH <sub>3</sub>
Ial.152 or Ib1.152	F	H	H	OSO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.153 or Ib1.153	CF <sub>3</sub>	H	H	F
Ial.154 or Ib1.154	CF <sub>3</sub>	H	H	Cl
Ial.155 or Ib1.155	CF <sub>3</sub>	H	H	Br
Ial.156 or Ib1.156	CF <sub>3</sub>	H	H	I
Ial.157 or Ib1.157	CF <sub>3</sub>	H	H	SCH <sub>3</sub>
Ial.158 or Ib1.158	CF <sub>3</sub>	H	H	SCH <sub>2</sub> CH <sub>3</sub>
Ial.159 or Ib1.159	CF <sub>3</sub>	H	H	SCO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.160 or Ib1.160	CF <sub>3</sub>	H	H	SO <sub>2</sub> CH <sub>3</sub>
Ial.161 or Ib1.161	CF <sub>3</sub>	H	H	SO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ial.162 or Ib1.162	CF <sub>3</sub>	H	H	SC <sub>6</sub> H <sub>5</sub>
Ial.163 or Ib1.163	CF <sub>3</sub>	H	H	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.164 or Ib1.164	CF <sub>3</sub>	H	H	S(4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ial.165 or Ib1.165	CF <sub>3</sub>	H	H	SO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.166 or Ib1.166	CF <sub>3</sub>	H	H	SO <sub>2</sub> (4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.167 or Ib1.167	CF <sub>3</sub>	H	H	SO <sub>2</sub> (4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ial.168 or Ib1.168	CF <sub>3</sub>	H	H	4-morpholiny
Ial.169 or Ib1.169	CF <sub>3</sub>	H	H	1-pyrrolidiny
Ial.170 or Ib1.170	CF <sub>3</sub>	H	H	1-(1,2,4-triazolyl)
Ial.171 or Ib1.171	CF <sub>3</sub>	H	H	1-imidazolyl
Ial.172 or Ib1.172	CF <sub>3</sub>	H	H	1-pyrazolyl
Ial.173 or Ib1.173	CF <sub>3</sub>	H	H	4-oxo-1,4-dihydro-1-pyridyl
Ial.174 or Ib1.174	CF <sub>3</sub>	H	H	N(OCH <sub>3</sub> )CH <sub>3</sub>
Ial.175 or Ib1.175	CF <sub>3</sub>	H	H	2-tetrahydroisoxazolyl
Ial.176 or Ib1.176	CF <sub>3</sub>	H	H	N(CH <sub>3</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ial.177 or Ib1.177	CF <sub>3</sub>	H	H	N(CH <sub>2</sub> CH=CH <sub>2</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ial.178 or Ib1.178	CF <sub>3</sub>	H	H	OPO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.179 or Ib1.179	CF <sub>3</sub>	H	H	OPO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.180 or Ib1.180	CF <sub>3</sub>	H	H	OPO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.181 or Ib1.181	CF <sub>3</sub>	H	H	OPO(OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.182 or Ib1.182	CF <sub>3</sub>	H	H	OPO(CH <sub>3</sub> ) <sub>2</sub>
Ial.183 or Ib1.183	CF <sub>3</sub>	H	H	OPO(CH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.184 or Ib1.184	CF <sub>3</sub>	H	H	OPO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.185 or Ib1.185	CF <sub>3</sub>	H	H	OPS(OCH <sub>3</sub> ) <sub>2</sub>
Ial.186 or Ib1.186	CF <sub>3</sub>	H	H	OPS(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.187 or Ib1.187	CF <sub>3</sub>	H	H	OP(OCH <sub>3</sub> ) <sub>2</sub>
Ial.188 or Ib1.188	CF <sub>3</sub>	H	H	OP(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.189 or Ib1.189	CF <sub>3</sub>	H	H	PO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.190 or Ib1.190	CF <sub>3</sub>	H	H	PO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.191 or Ib1.191	CF <sub>3</sub>	H	H	PO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.192 or Ib1.192	CF <sub>3</sub>	H	H	OCH <sub>3</sub>
Ial.193 or Ib1.193	CF <sub>3</sub>	H	H	OCH <sub>2</sub> CH <sub>3</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.194 or Ib1.194	CF <sub>3</sub>	H	H	OCH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.195 or Ib1.195	CF <sub>3</sub>	H	H	OCH <sub>2</sub> (2-furyl)
Ial.196 or Ib1.196	CF <sub>3</sub>	H	H	OCH <sub>2</sub> (3-furyl)
Ial.197 or Ib1.197	CF <sub>3</sub>	H	H	OCOOCH <sub>3</sub>
Ial.198 or Ib1.198	CF <sub>3</sub>	H	H	OCOOCH <sub>2</sub> CH <sub>3</sub>
Ial.199 or Ib1.199	CF <sub>3</sub>	H	H	OCOOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.200 or Ib1.200	CF <sub>3</sub>	H	H	OCOOC <sub>6</sub> H <sub>5</sub>
Ial.201 or Ib1.201	CF <sub>3</sub>	H	H	OCOOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.202 or Ib1.202	CF <sub>3</sub>	H	H	OCSOC <sub>6</sub> H <sub>5</sub>
Ial.203 or Ib1.203	CF <sub>3</sub>	H	H	OCSN(CH <sub>3</sub> ) <sub>2</sub>
Ial.204 or Ib1.204	CF <sub>3</sub>	H	H	OCON(CH <sub>3</sub> ) <sub>2</sub>
Ial.205 or Ib1.205	CF <sub>3</sub>	H	H	OCOSCH <sub>3</sub>
Ial.206 or Ib1.206	CF <sub>3</sub>	H	H	ON(CH <sub>3</sub> ) <sub>2</sub>
Ial.207 or Ib1.207	CF <sub>3</sub>	H	H	O-1-piperidyl
Ial.208 or Ib1.208	CF <sub>3</sub>	H	H	OCOCH <sub>3</sub>
Ial.209 or Ib1.209	CF <sub>3</sub>	H	H	OCOCH <sub>2</sub> CH <sub>3</sub>
Ial.210 or Ib1.210	CF <sub>3</sub>	H	H	OCOCHC(CH <sub>3</sub> ) <sub>2</sub>
Ial.211 or Ib1.211	CF <sub>3</sub>	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.212 or Ib1.212	CF <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>6</sub> CH <sub>3</sub>
Ial.213 or Ib1.213	CF <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>7</sub> CH <sub>3</sub>
Ial.214 or Ib1.214	CF <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>16</sub> CH <sub>3</sub>
Ial.215 or Ib1.215	CF <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>14</sub> CH <sub>3</sub>
Ial.216 or Ib1.216	CF <sub>3</sub>	H	H	OCOCH <sub>2</sub> CH <sub>2</sub> CH=CH <sub>2</sub>
Ial.217 or Ib1.217	CF <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>3</sub> O(2,4-Cl <sub>2</sub> -C <sub>6</sub> H <sub>3</sub> )
Ial.218 or Ib1.218	CF <sub>3</sub>	H	H	OCOCH(CH <sub>3</sub> )O- (2-CH <sub>3</sub> -4-Cl-C <sub>6</sub> H <sub>3</sub> )
Ial.219 or Ib1.219	CF <sub>3</sub>	H	H	OCOcyclopropyl
Ial.220 or Ib1.220	CF <sub>3</sub>	H	H	OCOcyclopentyl
Ial.221 or Ib1.221	CF <sub>3</sub>	H	H	OCOcyclohexyl
Ial.222 or Ib1.222	CF <sub>3</sub>	H	H	OCOC <sub>6</sub> H <sub>5</sub>
Ial.223 or Ib1.223	CF <sub>3</sub>	H	H	OCO(2-tetrahydrofuryl)
Ial.224 or Ib1.224	CF <sub>3</sub>	H	H	OCO(2-furyl)
Ial.225 or Ib1.225	CF <sub>3</sub>	H	H	OCO(2-thienyl)
Ial.226 or Ib1.226	CF <sub>3</sub>	H	H	OCO(3-pyridyl)
Ial.227 or Ib1.227	CF <sub>3</sub>	H	H	OSO <sub>2</sub> CH <sub>3</sub>
Ial.228 or Ib1.228	CF <sub>3</sub>	H	H	OSO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ial.229 or Ib1.229	Cl	H	H	F
Ial.230 or Ib1.230	Cl	H	H	Cl
Ial.231 or Ib1.231	Cl	H	H	Br
Ial.232 or Ib1.232	Cl	H	H	I
Ial.233 or Ib1.233	Cl	H	H	SCH <sub>3</sub>
Ial.234 or Ib1.234	Cl	H	H	SCH <sub>2</sub> CH <sub>3</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.235 or Ib1.235	Cl	H	H	SCO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.236 or Ib1.236	Cl	H	H	SO <sub>2</sub> CH <sub>3</sub>
Ial.237 or Ib1.237	Cl	H	H	SO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
5 Ial.238 or Ib1.238	Cl	H	H	SC <sub>6</sub> H <sub>5</sub>
Ial.239 or Ib1.239	Cl	H	H	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.240 or Ib1.240	Cl	H	H	S(4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ial.241 or Ib1.241	Cl	H	H	SO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
10 Ial.242 or Ib1.242	Cl	H	H	SO <sub>2</sub> (4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.243 or Ib1.243	Cl	H	H	SO <sub>2</sub> (4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ial.244 or Ib1.244	Cl	H	H	4-morpholinyl
Ial.245 or Ib1.245	Cl	H	H	1-pyrrolidinyl
Ial.246 or Ib1.246	Cl	H	H	1-(1,2,4-triazolyl)
15 Ial.247 or Ib1.247	Cl	H	H	1-imidazolyl
Ial.248 or Ib1.248	Cl	H	H	1-pyrazolyl
Ial.249 or Ib1.249	Cl	H	H	4-oxo-1,4-dihydro-1-pyridyl
20 Ial.250 or Ib1.250	Cl	H	H	N(OCH <sub>3</sub> )CH <sub>3</sub>
Ial.251 or Ib1.251	Cl	H	H	2-tetrahydroisoxazolyl
Ial.252 or Ib1.252	Cl	H	H	N(CH <sub>3</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ial.253 or Ib1.253	Cl	H	H	N(CH <sub>2</sub> CH=CH <sub>2</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ial.254 or Ib1.254	Cl	H	H	OPO(OCH <sub>3</sub> ) <sub>2</sub>
25 Ial.255 or Ib1.255	Cl	H	H	OPO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.256 or Ib1.256	Cl	H	H	OPO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.257 or Ib1.257	Cl	H	H	OPO(OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.258 or Ib1.258	Cl	H	H	OPO(CH <sub>3</sub> ) <sub>2</sub>
Ial.259 or Ib1.259	Cl	H	H	OPO(CH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
30 Ial.260 or Ib1.260	Cl	H	H	OPO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.261 or Ib1.261	Cl	H	H	OPS(OCH <sub>3</sub> ) <sub>2</sub>
Ial.262 or Ib1.262	Cl	H	H	OPS(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.263 or Ib1.263	Cl	H	H	OP(OCH <sub>3</sub> ) <sub>2</sub>
35 Ial.264 or Ib1.264	Cl	H	H	OP(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.265 or Ib1.265	Cl	H	H	PO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.266 or Ib1.266	Cl	H	H	PO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.267 or Ib1.267	Cl	H	H	PO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.268 or Ib1.268	Cl	H	H	OCH <sub>3</sub>
40 Ial.269 or Ib1.269	Cl	H	H	OCH <sub>2</sub> CH <sub>3</sub>
Ial.270 or Ib1.270	Cl	H	H	OCH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.271 or Ib1.271	Cl	H	H	OCH <sub>2</sub> (2-furyl)
Ial.272 or Ib1.272	Cl	H	H	OCH <sub>2</sub> (3-furyl)
45 Ial.273 or Ib1.273	Cl	H	H	OCOOCH <sub>3</sub>
Ial.274 or Ib1.274	Cl	H	H	OCOOCH <sub>2</sub> CH <sub>3</sub>
Ial.275 or Ib1.275	Cl	H	H	OCOOCH(CH <sub>3</sub> ) <sub>2</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.276 or Ib1.276	Cl	H	H	OCOOC <sub>6</sub> H <sub>5</sub>
Ial.277 or Ib1.277	Cl	H	H	OCOOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.278 or Ib1.278	Cl	H	H	OCSOC <sub>6</sub> H <sub>5</sub>
Ial.279 or Ib1.279	Cl	H	H	OCSN(CH <sub>3</sub> ) <sub>2</sub>
Ial.280 or Ib1.280	Cl	H	H	OCON(CH <sub>3</sub> ) <sub>2</sub>
Ial.281 or Ib1.281	Cl	H	H	OCOSCH <sub>3</sub>
Ial.282 or Ib1.282	Cl	H	H	ON(CH <sub>3</sub> ) <sub>2</sub>
Ial.283 or Ib1.283	Cl	H	H	O-1-piperidyl
Ial.284 or Ib1.284	Cl	H	H	OCOCH <sub>3</sub>
Ial.285 or Ib1.285	Cl	H	H	OCOCH <sub>2</sub> CH <sub>3</sub>
Ial.286 or Ib1.286	Cl	H	H	OCOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.287 or Ib1.287	Cl	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.288 or Ib1.288	Cl	H	H	OCO(CH <sub>2</sub> ) <sub>6</sub> CH <sub>3</sub>
Ial.289 or Ib1.289	Cl	H	H	OCO(CH <sub>2</sub> ) <sub>7</sub> CH <sub>3</sub>
Ial.290 or Ib1.290	Cl	H	H	OCO(CH <sub>2</sub> ) <sub>16</sub> CH <sub>3</sub>
Ial.291 or Ib1.291	Cl	H	H	OCO(CH <sub>2</sub> ) <sub>14</sub> CH <sub>3</sub>
Ial.292 or Ib1.292	Cl	H	H	OCOCH <sub>2</sub> CH <sub>2</sub> CH=CH <sub>2</sub>
Ial.293 or Ib1.293	Cl	H	H	OCO(CH <sub>2</sub> ) <sub>3</sub> O(2,4-Cl <sub>2</sub> -C <sub>6</sub> H <sub>3</sub> )
Ial.294 or Ib1.294	Cl	H	H	OCOCH(CH <sub>3</sub> )O-(2-CH <sub>3</sub> -4-Cl-C <sub>6</sub> H <sub>3</sub> )
Ial.295 or Ib1.295	Cl	H	H	OCOcyclopropyl
Ial.296 or Ib1.296	Cl	H	H	OCOcyclopentyl
Ial.297 or Ib1.297	Cl	H	H	OCOcyclohexyl
Ial.298 or Ib1.298	Cl	H	H	OCOC <sub>6</sub> H <sub>5</sub>
Ial.299 or Ib1.299	Cl	H	H	OCO(2-tetrahydrofuryl)
Ial.300 or Ib1.300	Cl	H	H	OCO(2-furyl)
Ial.301 or Ib1.301	Cl	H	H	OCO(2-thienyl)
Ial.302 or Ib1.302	Cl	H	H	OCO(3-pyridyl)
Ial.303 or Ib1.303	Cl	H	H	OSO <sub>2</sub> CH <sub>3</sub>
Ial.304 or Ib1.304	Cl	H	H	OSO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ial.305 or Ib1.305	CHF <sub>2</sub>	H	H	F
Ial.306 or Ib1.306	CHF <sub>2</sub>	H	H	Cl
Ial.307 or Ib1.307	CHF <sub>2</sub>	H	H	Br
Ial.308 or Ib1.308	CHF <sub>2</sub>	H	H	I
Ial.309 or Ib1.309	CHF <sub>2</sub>	H	H	SCH <sub>3</sub>
Ial.310 or Ib1.310	CHF <sub>2</sub>	H	H	SCH <sub>2</sub> CH <sub>3</sub>
Ial.311 or Ib1.311	CHF <sub>2</sub>	H	H	SCO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.312 or Ib1.312	CHF <sub>2</sub>	H	H	SO <sub>2</sub> CH <sub>3</sub>
Ial.313 or Ib1.313	CHF <sub>2</sub>	H	H	SO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ial.314 or Ib1.314	CHF <sub>2</sub>	H	H	SC <sub>6</sub> H <sub>5</sub>
Ial.315 or Ib1.315	CHF <sub>2</sub>	H	H	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.316 or Ib1.316	CHF <sub>2</sub>	H	H	S(4-Cl-C <sub>6</sub> H <sub>4</sub> )

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.317 or Ib1.317	CHF <sub>2</sub>	H	H	SO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.318 or Ib1.318	CHF <sub>2</sub>	H	H	SO <sub>2</sub> (4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.319 or Ib1.319	CHF <sub>2</sub>	H	H	SO <sub>2</sub> (4-Cl-C <sub>6</sub> H <sub>4</sub> )
5 Ial.320 or Ib1.320	CHF <sub>2</sub>	H	H	4-morpholinyl
Ial.321 or Ib1.321	CHF <sub>2</sub>	H	H	1-pyrrolidinyl
Ial.322 or Ib1.322	CHF <sub>2</sub>	H	H	1-(1,2,4-triazolyl)
Ial.323 or Ib1.323	CHF <sub>2</sub>	H	H	1-imidazolyl
10 Ial.324 or Ib1.324	CHF <sub>2</sub>	H	H	1-pyrazolyl
Ial.325 or Ib1.325	CHF <sub>2</sub>	H	H	4-oxo-1,4-dihydro-1-pyridyl
Ial.326 or Ib1.326	CHF <sub>2</sub>	H	H	N(OCH <sub>3</sub> )CH <sub>3</sub>
Ial.327 or Ib1.327	CHF <sub>2</sub>	H	H	2-tetrahydroisoxazolyl
15 Ial.328 or Ib1.328	CHF <sub>2</sub>	H	H	N(CH <sub>3</sub> )N(CH <sub>3</sub> ) <sub>3</sub>
Ial.329 or Ib1.329	CHF <sub>2</sub>	H	H	N(CH <sub>2</sub> CH=CH <sub>2</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ial.330 or Ib1.330	CHF <sub>2</sub>	H	H	OPO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.331 or Ib1.331	CHF <sub>2</sub>	H	H	OPO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
20 Ial.332 or Ib1.332	CHF <sub>2</sub>	H	H	OPO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.333 or Ib1.333	CHF <sub>2</sub>	H	H	OPO(OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.334 or Ib1.334	CHF <sub>2</sub>	H	H	OPO(CH <sub>3</sub> ) <sub>2</sub>
Ial.335 or Ib1.335	CHF <sub>2</sub>	H	H	OPO(CH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.336 or Ib1.336	CHF <sub>2</sub>	H	H	OPO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
25 Ial.337 or Ib1.337	CHF <sub>2</sub>	H	H	OPS(OCH <sub>3</sub> ) <sub>2</sub>
Ial.338 or Ib1.338	CHF <sub>2</sub>	H	H	OPS(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.339 or Ib1.339	CHF <sub>2</sub>	H	H	OP(OCH <sub>3</sub> ) <sub>2</sub>
Ial.340 or Ib1.340	CHF <sub>2</sub>	H	H	OP(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.341 or Ib1.341	CHF <sub>2</sub>	H	H	PO(OCH <sub>3</sub> ) <sub>2</sub>
30 Ial.342 or Ib1.342	CHF <sub>2</sub>	H	H	PO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.343 or Ib1.343	CHF <sub>2</sub>	H	H	PO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.344 or Ib1.344	CHF <sub>2</sub>	H	H	OCH <sub>3</sub>
Ial.345 or Ib1.345	CHF <sub>2</sub>	H	H	OCH <sub>2</sub> CH <sub>3</sub>
35 Ial.346 or Ib1.346	CHF <sub>2</sub>	H	H	OCH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.347 or Ib1.347	CHF <sub>2</sub>	H	H	OCH <sub>2</sub> (2-furyl)
Ial.348 or Ib1.348	CHF <sub>2</sub>	H	H	OCH <sub>2</sub> (3-furyl)
Ial.349 or Ib1.349	CHF <sub>2</sub>	H	H	OCOOCH <sub>3</sub>
Ial.350 or Ib1.350	CHF <sub>2</sub>	H	H	OCOOCH <sub>2</sub> CH <sub>3</sub>
40 Ial.351 or Ib1.351	CHF <sub>2</sub>	H	H	OCOOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.352 or Ib1.352	CHF <sub>2</sub>	H	H	OCOO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.353 or Ib1.353	CHF <sub>2</sub>	H	H	OCOO(CH <sub>3</sub> ) <sub>3</sub>
Ial.354 or Ib1.354	CHF <sub>2</sub>	H	H	OCSOC <sub>6</sub> H <sub>5</sub>
45 Ial.355 or Ib1.355	CHF <sub>2</sub>	H	H	OCSN(CH <sub>3</sub> ) <sub>2</sub>
Ial.356 or Ib1.356	CHF <sub>2</sub>	H	H	OCON(CH <sub>3</sub> ) <sub>2</sub>
Ial.357 or Ib1.357	CHF <sub>2</sub>	H	H	OCOSCH <sub>3</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.358 or Ib1.358	CHF <sub>2</sub>	H	H	ON(CH <sub>3</sub> ) <sub>2</sub>
Ial.359 or Ib1.359	CHF <sub>2</sub>	H	H	O-1-piperidyl
Ial.360 or Ib1.360	CHF <sub>2</sub>	H	H	OCOCH <sub>3</sub>
Ial.361 or Ib1.361	CHF <sub>2</sub>	H	H	OCOCH <sub>2</sub> CH <sub>3</sub>
Ial.362 or Ib1.362	CHF <sub>2</sub>	H	H	OCOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.363 or Ib1.363	CHF <sub>2</sub>	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.364 or Ib1.364	CHF <sub>2</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>6</sub> CH <sub>3</sub>
Ial.365 or Ib1.365	CHF <sub>2</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>7</sub> CH <sub>3</sub>
Ial.366 or Ib1.366	CHF <sub>2</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>16</sub> CH <sub>3</sub>
Ial.367 or Ib1.367	CHF <sub>2</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>14</sub> CH <sub>3</sub>
Ial.368 or Ib1.368	CHF <sub>2</sub>	H	H	OCOCH <sub>2</sub> CH <sub>2</sub> CH=CH <sub>2</sub>
Ial.369 or Ib1.369	CHF <sub>2</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>3</sub> O(2,4-Cl <sub>2</sub> -C <sub>6</sub> H <sub>3</sub> )
Ial.370 or Ib1.370	CHF <sub>2</sub>	H	H	OCOCH(CH <sub>3</sub> )O-(2-CH <sub>3</sub> -4-Cl-C <sub>6</sub> H <sub>3</sub> )
Ial.371 or Ib1.371	CHF <sub>2</sub>	H	H	OCOCyclopropyl
Ial.372 or Ib1.372	CHF <sub>2</sub>	H	H	OCOCyclopentyl
Ial.373 or Ib1.373	CHF <sub>2</sub>	H	H	OCOCyclohexyl
Ial.374 or Ib1.374	CHF <sub>2</sub>	H	H	OCOC <sub>6</sub> H <sub>5</sub>
Ial.375 or Ib1.375	CHF <sub>2</sub>	H	H	OCO(2-tetrahydrofuryl)
Ial.376 or Ib1.376	CHF <sub>2</sub>	H	H	OCO(2-furyl)
Ial.377 or Ib1.377	CHF <sub>2</sub>	H	H	OCO(2-thienyl)
Ial.378 or Ib1.378	CHF <sub>2</sub>	H	H	OCO(3-pyridyl)
Ial.379 or Ib1.379	CHF <sub>2</sub>	H	H	OSO <sub>2</sub> CH <sub>5</sub>
Ial.380 or Ib1.380	CHF <sub>2</sub>	H	H	OSO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ial.381 or Ib1.381	Cl	CH <sub>3</sub>	H	F
Ial.382 or Ib1.382	Cl	CH <sub>3</sub>	H	Cl
Ial.383 or Ib1.383	Cl	CH <sub>3</sub>	H	Br
Ial.384 or Ib1.384	Cl	CH <sub>3</sub>	H	I
Ial.385 or Ib1.385	Cl	CH <sub>3</sub>	H	SCH <sub>3</sub>
Ial.386 or Ib1.386	Cl	CH <sub>3</sub>	H	SCH <sub>2</sub> CH <sub>3</sub>
Ial.387 or Ib1.387	Cl	CH <sub>3</sub>	H	SCO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.388 or Ib1.388	Cl	CH <sub>3</sub>	H	SO <sub>2</sub> CH <sub>3</sub>
Ial.389 or Ib1.389	Cl	CH <sub>3</sub>	H	SO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Ial.390 or Ib1.390	Cl	CH <sub>3</sub>	H	SC <sub>6</sub> H <sub>5</sub>
Ial.391 or Ib1.391	Cl	CH <sub>3</sub>	H	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.392 or Ib1.392	Cl	CH <sub>3</sub>	H	S(4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ial.393 or Ib1.393	Cl	CH <sub>3</sub>	H	SO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.394 or Ib1.394	Cl	CH <sub>3</sub>	H	SO <sub>2</sub> (4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )
Ial.395 or Ib1.395	Cl	CH <sub>3</sub>	H	SO <sub>2</sub> (4-Cl-C <sub>6</sub> H <sub>4</sub> )
Ial.396 or Ib1.396	Cl	CH <sub>3</sub>	H	4-morpholinyl
Ial.397 or Ib1.397	Cl	CH <sub>3</sub>	H	1-pyrrolidinyl
Ial.398 or Ib1.398	Cl	CH <sub>3</sub>	H	1-(1,2,4-triazolyl)

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ial.399 or Ib1.399	Cl	CH <sub>3</sub>	H	1-imidazolyl
Ial.400 or Ib1.400	Cl	CH <sub>3</sub>	H	1-pyrazolyl
5 Ial.401 or Ib1.401	Cl	CH <sub>3</sub>	H	4-oxo-1,4-dihydro-1-pyridyl
Ial.402 or Ib1.402	Cl	CH <sub>3</sub>	H	N(OCH <sub>3</sub> )CH <sub>3</sub>
Ial.403 or Ib1.403	Cl	CH <sub>3</sub>	H	2-tetrahydroisoxazolyl
Ial.404 or Ib1.404	Cl	CH <sub>3</sub>	H	N(CH <sub>3</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
10 Ial.405 or Ib1.405	Cl	CH <sub>3</sub>	H	N(CH <sub>2</sub> CH=CH <sub>2</sub> )N(CH <sub>3</sub> ) <sub>2</sub>
Ial.406 or Ib1.406	Cl	CH <sub>3</sub>	H	OPO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.407 or Ib1.407	Cl	CH <sub>3</sub>	H	OPO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.408 or Ib1.408	Cl	CH <sub>3</sub>	H	OPO(N(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub>
Ial.409 or Ib1.409	Cl	CH <sub>3</sub>	H	OPO(OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
15 Ial.410 or Ib1.410	Cl	CH <sub>3</sub>	H	OPO(CH <sub>3</sub> ) <sub>2</sub>
Ial.411 or Ib1.411	Cl	CH <sub>3</sub>	H	OPO(CH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.412 or Ib1.412	Cl	CH <sub>3</sub>	H	OPO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
20 Ial.413 or Ib1.413	Cl	CH <sub>3</sub>	H	OPS(OCH <sub>3</sub> ) <sub>2</sub>
Ial.414 or Ib1.414	Cl	CH <sub>3</sub>	H	OPS(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.415 or Ib1.415	Cl	CH <sub>3</sub>	H	OP(OCH <sub>3</sub> ) <sub>2</sub>
Ial.416 or Ib1.416	Cl	CH <sub>3</sub>	H	OP(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
Ial.417 or Ib1.417	Cl	CH <sub>3</sub>	H	PO(OCH <sub>3</sub> ) <sub>2</sub>
Ial.418 or Ib1.418	Cl	CH <sub>3</sub>	H	PO(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>
25 Ial.419 or Ib1.419	Cl	CH <sub>3</sub>	H	PO(C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub>
Ial.420 or Ib1.420	Cl	CH <sub>3</sub>	H	OCH <sub>3</sub>
Ial.421 or Ib1.421	Cl	CH <sub>3</sub>	H	OCH <sub>2</sub> CH <sub>3</sub>
Ial.422 or Ib1.422	Cl	CH <sub>3</sub>	H	OCH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>
Ial.423 or Ib1.423	Cl	CH <sub>3</sub>	H	OCH <sub>2</sub> (2-furyl)
30 Ial.424 or Ib1.424	Cl	CH <sub>3</sub>	H	OCH <sub>2</sub> (3-furyl)
Ial.425 or Ib1.425	Cl	CH <sub>3</sub>	H	OCOOCH <sub>3</sub>
Ial.426 or Ib1.426	Cl	CH <sub>3</sub>	H	OCOOCH <sub>2</sub> CH <sub>3</sub>
Ial.427 or Ib1.427	Cl	CH <sub>3</sub>	H	OCOOCH(CH <sub>3</sub> ) <sub>2</sub>
35 Ial.428 or Ib1.428	Cl	CH <sub>3</sub>	H	OCOOC <sub>6</sub> H <sub>5</sub>
Ial.429 or Ib1.429	Cl	CH <sub>3</sub>	H	OCOOC(CH <sub>3</sub> ) <sub>3</sub>
Ial.430 or Ib1.430	Cl	CH <sub>3</sub>	H	OCSOC <sub>6</sub> H <sub>5</sub>
Ial.431 or Ib1.431	Cl	CH <sub>3</sub>	H	OCSN(CH <sub>3</sub> ) <sub>2</sub>
Ial.432 or Ib1.432	Cl	CH <sub>3</sub>	H	OCON(CH <sub>3</sub> ) <sub>2</sub>
40 Ial.433 or Ib1.433	Cl	CH <sub>3</sub>	H	OCOSCH <sub>3</sub>
Ial.434 or Ib1.434	Cl	CH <sub>3</sub>	H	ON(CH <sub>3</sub> ) <sub>2</sub>
Ial.435 or Ib1.435	Cl	CH <sub>3</sub>	H	O-1-piperidyl
Ial.436 or Ib1.436	Cl	CH <sub>3</sub>	H	OCOCH <sub>3</sub>
45 Ial.437 or Ib1.437	Cl	CH <sub>3</sub>	H	OCOCH <sub>2</sub> CH <sub>3</sub>
Ial.438 or Ib1.438	Cl	CH <sub>3</sub>	H	OCOCH(CH <sub>3</sub> ) <sub>2</sub>
Ial.439 or Ib1.439	Cl	CH <sub>3</sub>	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>
Ia1.440 or Ib1.440	Cl	CH <sub>3</sub>	H	OCO(CH <sub>2</sub> ) <sub>6</sub> CH <sub>3</sub>
Ia1.441 or Ib1.441	Cl	CH <sub>3</sub>	H	OCO(CH <sub>2</sub> ) <sub>7</sub> CH <sub>3</sub>
Ia1.442 or Ib1.442	Cl	CH <sub>3</sub>	H	OCO(CH <sub>2</sub> ) <sub>16</sub> CH <sub>3</sub>
5 Ia1.443 or Ib1.443	Cl	CH <sub>3</sub>	H	OCO(CH <sub>2</sub> ) <sub>14</sub> CH <sub>3</sub>
Ia1.444 or Ib1.444	Cl	CH <sub>3</sub>	H	OCOCH <sub>2</sub> CH <sub>2</sub> CH=CH <sub>2</sub>
Ia1.445 or Ib1.445	Cl	CH <sub>3</sub>	H	OCO(CH <sub>2</sub> ) <sub>3</sub> O(2,4-Cl <sub>2</sub> -C <sub>6</sub> H <sub>3</sub> )
10 Ia1.446 or Ib1.446	Cl	CH <sub>3</sub>	H	OCOCH(CH <sub>3</sub> )O-(2-CH <sub>3</sub> -4-Cl-C <sub>6</sub> H <sub>3</sub> )
Ia1.447 or Ib1.447	Cl	CH <sub>3</sub>	H	OCOCyclopropyl
Ia1.448 or Ib1.448	Cl	CH <sub>3</sub>	H	OCOCyclopentyl
Ia1.449 or Ib1.449	Cl	CH <sub>3</sub>	H	OCOCyclohexyl
Ia1.450 or Ib1.450	Cl	CH <sub>3</sub>	H	OCOC <sub>6</sub> H <sub>5</sub>
15 Ia1.451 or Ib1.451	Cl	CH <sub>3</sub>	H	OCO(2-tetrahydrofuryl)
Ia1.452 or Ib1.452	Cl	CH <sub>3</sub>	H	OCO(2-furyl)
Ia1.453 or Ib1.453	Cl	CH <sub>3</sub>	H	OCO(2-thienyl)
Ia1.454 or Ib1.454	Cl	CH <sub>3</sub>	H	OCO(3-pyridyl)
20 Ia1.455 or Ib1.455	Cl	CH <sub>3</sub>	H	OSO <sub>2</sub> CH <sub>3</sub>
Ia1.456 or Ib1.456	Cl	CH <sub>3</sub>	H	OSO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>

Extraordinary preference is furthermore given to the following cyclohexenonequinolinoyl derivatives of the formula I:

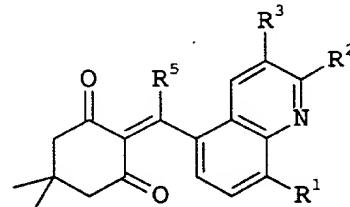
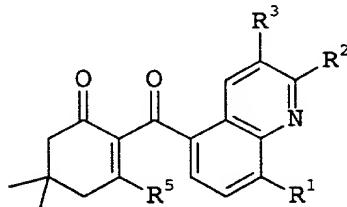
25

- the compounds of the formulae Ia2 and Ib2, in particular the compounds Ia2.1 to Ia2.456 and the compounds Ib2.1 to Ib2.456, which differ from the compounds Ia1.1 to Ia1.456 and Ib1.1 to Ib1.456, respectively, in that (R<sup>6</sup>)<sub>1</sub> is

30

"5,5-dimethyl".

35

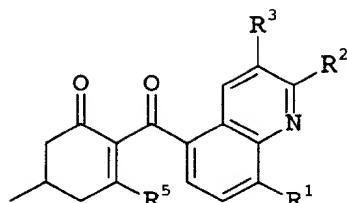


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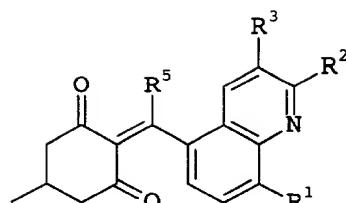
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- the compounds of the formulae Ia3 and Ib3, in particular the compounds Ia3.1 to Ia3.456 and the compounds Ib3.1 to Ib3.456, which differ from the compounds Ia1.1 to Ia1.456 and Ib1.1 to Ib1.456, respectively, in that (R<sup>6</sup>)<sub>1</sub> is "5-methyl".

5



Ia3

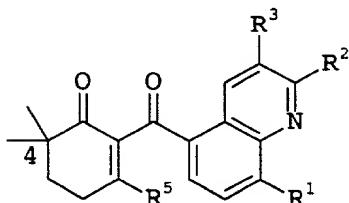


Ib3

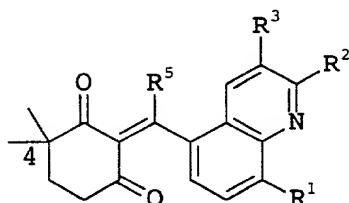
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- the compounds of the formulae Ia4 and Ib4, in particular the compounds Ia4.1 to Ia4.456 and the compounds Ib4.1 to Ib4.456, which differ from the compounds Ia1.1 to Ia1.456 and Ib1.1 to Ib1.456, respectively, in that (R<sup>6</sup>)<sub>1</sub> is "4,4-dimethyl".

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Ia4



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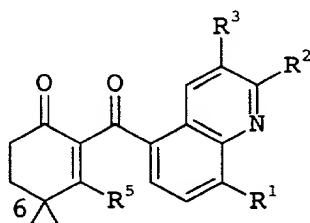
Ib4

30

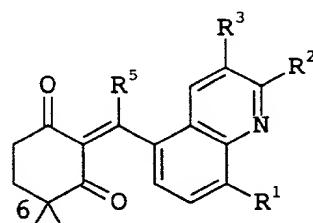
- the compounds of the formulae Ia5 and Ib5, in particular the compounds Ia5.1 to Ia5.456 and the compounds Ib5.1 to Ib5.456, which differ from the compounds Ia1.1 to Ia1.456 and Ib1.1 to Ib1.456, respectively, in that (R<sup>6</sup>)<sub>1</sub> is "6,6-dimethyl".

35

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Ia5



Ib5

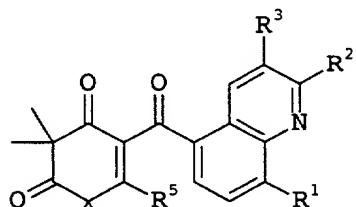
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DETAILED DESCRIPTION OF THE INVENTION

- the compounds of the formulae Ia6 and Ib6, in particular the compounds Ia6.1 to Ia6.456 and the compounds Ib6.1 to Ib6.456, which differ from the compounds Ia1.1 to Ia1.456 and Ib1.1 to Ib1.456, respectively, in that  $(R^6)_1$  is "4,4,6,6-tetramethyl-5-oxo".

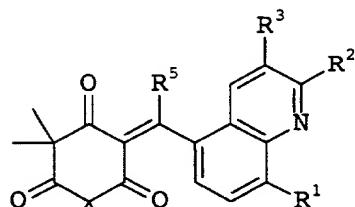
5 "4,4,6,6-tetramethyl-5-oxo".

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Ia6

15

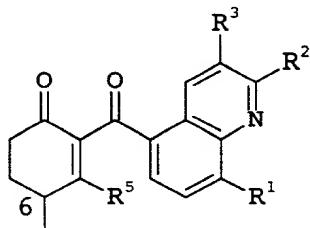


Ib6

20

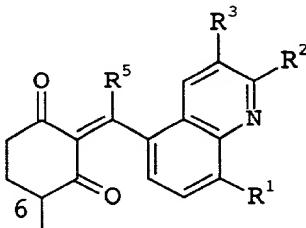
- the compounds of the formulae Ia7 and Ib7, in particular the compounds Ia7.1 to Ia7.456 and the compounds Ib7.1 to Ib7.456, which differ from the compounds Ia1.1 to Ia1.456 and Ib1.1 to Ib1.456, respectively, in that  $(R^6)_1$  is "6-methyl".

25



Ia7

30



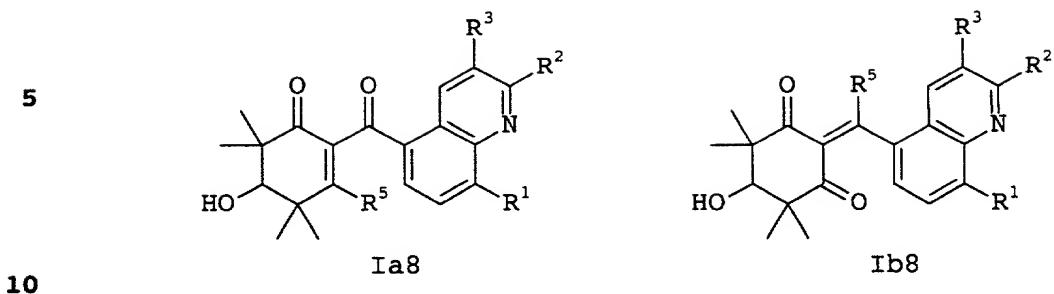
Ib7

35

- the compounds of the formulae Ia8 and Ib8, in particular the compounds Ia8.1 to Ia8.456 and the compounds Ib8.1 to Ib8.456, which differ from the compounds Ia1.1 to Ia1.456 and Ib1.1 to Ib1.456, respectively, in that  $(R^6)_1$  is "5-hydroxy-4,4,6,6-tetramethyl".

40

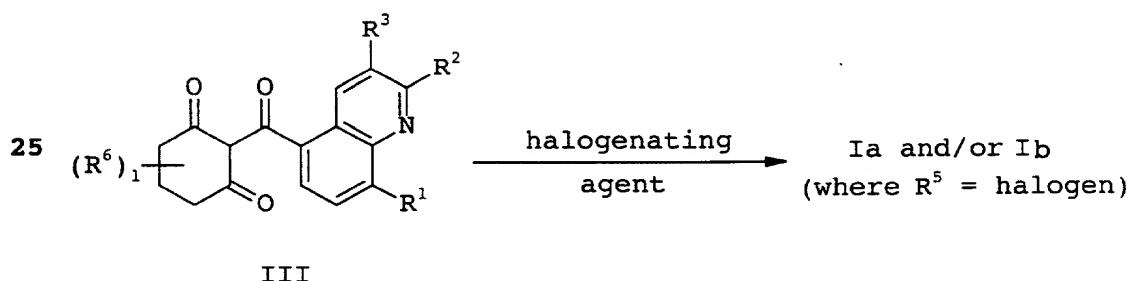
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The cyclohexenonequinolinoyl derivatives of the formula I can be obtained by various routes, for example by the following 15 processes:

A. Preparation of compounds of the formula I where  $R^5$  = halogen by reaction of cyclohexanone derivatives of the formula III with halogenating agents:

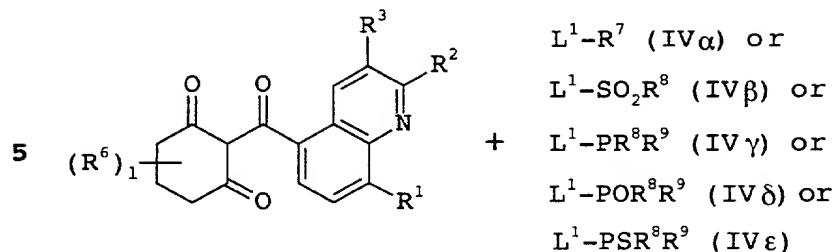
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Suitable halogenating agents are, for example, phosgene, diphosgene, triphosgene, thionyl chloride, oxalyl chloride, phosphorus chloride, phosphorus pentachloride, mesyl chloride, chloromethylene-*N,N*-dimethylammonium chloride, 35 oxalyl bromide, phosphorus oxybromide etc.

B. Preparation of compounds of the formula I where  $R^5$  =  $OR^7$ ,  $OSO_2R^8$ ,  $OPR^8R^9$ ,  $OPOR^8R^9$  or  $OPSR^8R^9$  by reaction of cyclohexane dione derivatives of the formula III with alkylating, 40 sulfonylating or phosphorylating agents IV $\alpha$ , IV $\beta$ , IV $\gamma$ , IV $\delta$  or IV $\varepsilon$ .



10

1

Ia and/or Ib  
(where  $R^5 = OR^7$ ,  $OSO_2R^8$ ,  
 $OPR^8R^9$ ,  $OPOR^8R^9$   
or  $OPSR^8R^9$ )

$L^1$  is a nucleophilically replaceable leaving group, such as halogen, for example chlorine or bromine, hetaryl, for example imidazolyl, carboxylate, for example acetate, or sulfonate, for example mesylate or triflate, etc.

The compounds of the formula IV $\alpha$ , IV $\beta$ , IV $\gamma$ , IV $\delta$  or IV $\varepsilon$  can be employed directly such as, for example, in the case of the carbonyl halides, or generated in situ, for example activated carboxylic acids (using carboxylic acid and dicyclohexyl carbodiimide, etc.).

30 C. Preparation of compounds of the formula I where  $R^5 = OR^7, SR^7, POR^8R^9, NR^{10}R^{11}, ONR^{11}R^{12}$ , N-linked heterocyclyl or O-(N-linked heterocyclyl) by reaction of compounds of the formula I where  $R^5 = \text{halogen}, OSO_2R^8$  (I $\alpha$ ) with compounds of the formula V $\alpha$ , V $\beta$ , V $\gamma$ , V $\delta$ , V $\epsilon$ , V $\eta$  or V $\vartheta$ , if appropriate in the presence of a base or with prior formation of salt.

35

40

45

HOR<sup>7</sup> (V $\alpha$ ) or  
 HSR<sup>7</sup> (V $\beta$ ) or  
 HPOR<sup>8</sup>R<sup>9</sup> (V $\gamma$ ) or  
 5 Ia and/or Ib + HNR<sup>10</sup>R<sup>11</sup> (V $\delta$ ) or  
 where R<sup>5</sup> = halogen, OSO<sub>2</sub>R<sup>8</sup>) HONR<sup>11</sup>R<sup>12</sup> (V $\varepsilon$ ) or  
 H(N-linked  
 heterocyclyl) (V $\eta$ ) or  
 10 H(ON-linked  
 heterocyclyl) (V $\vartheta$ )  
 ↓  
 Ia and/or Ib  
 (where R<sup>5</sup> = OR<sup>7</sup>, SR<sup>7</sup>,  
 15 POR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup>,  
 ONR<sup>11</sup>R<sup>12</sup>,  
 N-linked  
 heterocyclyl or  
 ON-linked  
 heterocyclyl)  
 20

D. Preparation of compounds of the formula I where R<sup>5</sup> = SOR<sup>8</sup>,  
 SO<sub>2</sub>R<sup>8</sup> by reaction of compounds of the formula I where R<sup>5</sup> = SR<sup>8</sup>  
 (I $\beta$ ) with an oxidizing agent.

25 Ia and/or Ib       $\xrightarrow{\text{oxidizing agent}}$       Ia and/or Ib  
 (where R<sup>5</sup> = SR<sup>8</sup>)      (where R<sup>5</sup> = SOR<sup>8</sup> or SO<sub>2</sub>R<sup>8</sup>)

30 Suitable oxidizing agents are, for example,  
 m-chloroperbenzoic acid, peroxy acetic acid, trifluoroperoxy  
 acetic acid, hydrogen peroxide, if appropriate in the  
 presence of a catalyst such as tungstate.

35 The following conditions apply to the abovementioned reactions:  
 The starting materials are generally employed in equimolar  
 amounts. However, it will also be advantageous to employ an  
 40 excess of one or the other component.

If appropriate, it may be advantageous to carry out the reactions  
 in the presence of a base. Here, the starting materials and the  
 base are advantageously employed in equimolar amounts. An excess  
 45 of base, for example 1.5 to 3 molar equivalents, based on Ia

and/or Ib (where R<sup>5</sup> = halogen or OSO<sub>2</sub>R<sup>8</sup>) or III may in certain cases be advantageous.

Suitable bases are tertiary alkyl amines, such as triethylamine,  
5 aromatic amines, such as pyridine, alkali metal carbonates, for example sodium carbonate or potassium carbonate, alkali metal bicarbonates, such as sodium bicarbonate and potassium bicarbonate, alkali metal alkoxides, such as sodium methoxide, sodium ethoxide, potassium tert-butoxide or alkali metal  
10 hydrides, for example sodium hydride. Preference is given to using triethylamine or pyridine.

Suitable solvents are, for example, chlorinated hydrocarbons,  
15 such as methylene chloride or 1,2-dichloroethane, aromatic hydrocarbons, for example toluene, xylene or chlorobenzene, ethers, such as diethyl ether, methyl-tert-butyl ether, tetrahydrofuran or dioxane, polar aprotic solvents, such as acetonitrile, dimethyl formamide or dimethyl sulfoxide, or  
20 esters, such as ethyl acetate, or mixtures of these.

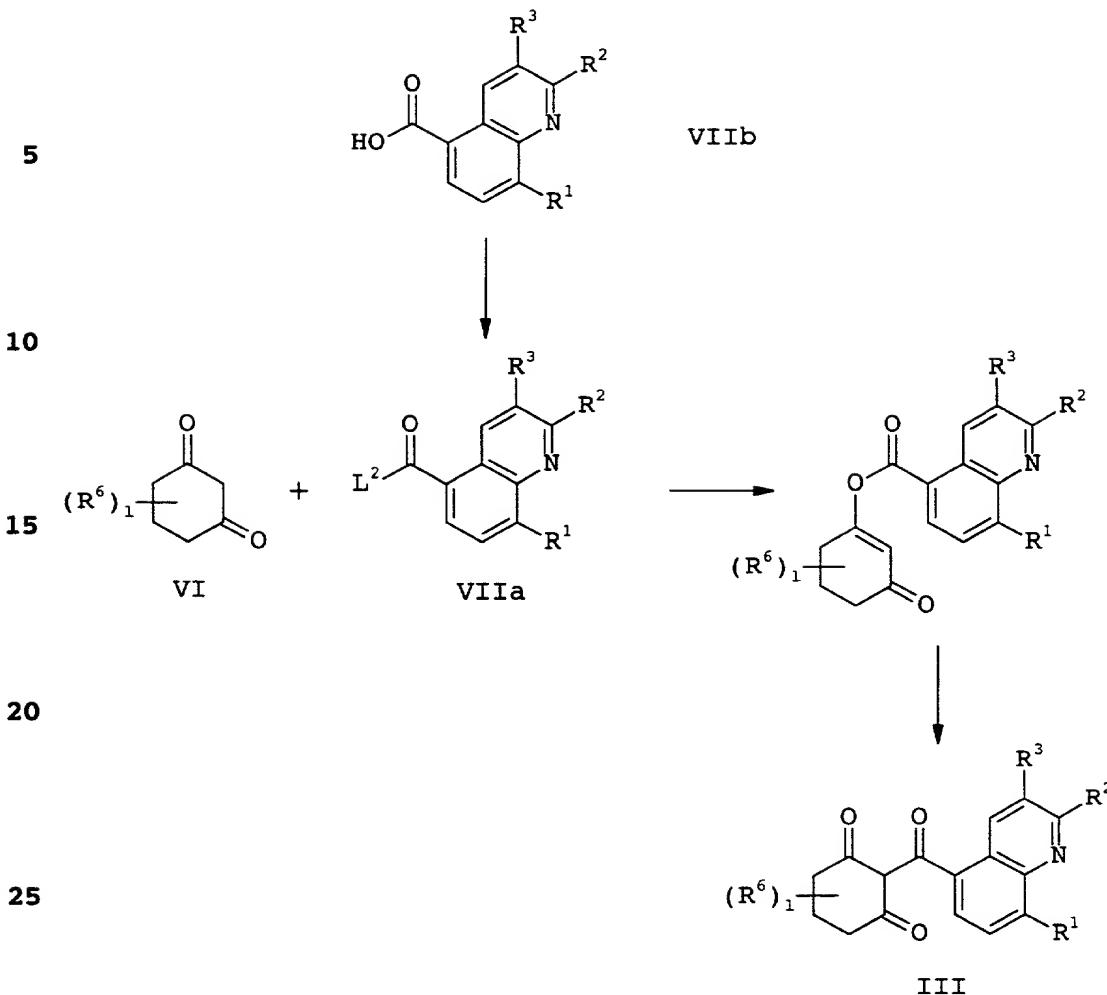
The reaction temperature is generally in the range of from 0°C to the boiling point of the reaction mixture.

25 Work-up to give the product can be carried out in a manner known per se.

Depending on the reaction conditions, the compounds Ia, Ib or mixtures of these can be formed. The latter can be separated by  
30 classical separation methods, such as, for example, crystallization, chromatography, etc.

The cyclohexanedione derivatives of the formula III are known or can be prepared by processes known per se (for example DE-A 19  
35 532 311), for example by reacting cyclohexanones of the formula VI with an activated benzoic acid VIIa or a benzoic acid VIIb, which is preferably activated in situ, to give the acylation product which is subsequently rearranged.

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30  $L^2$  is a nucleophilically replaceable leaving group, such as halogen, for example bromine or chlorine, hetaryl, for example imidazolyl or pyridyl, carboxylate, for example acetate or trifluoroacetate, etc.

35 The activated benzoic acid VIIa can be employed directly, such as in the case of the benzoyl halides, or be generated in situ, for example using dicyclohexyl carbodiimide, triphenylphosphine/azodicarboxylic ester, 2-pyridine disulfide/triphenyl phosphine, carbonyldiimidazole, etc.

40 If appropriate, it may be advantageous to carry out the acylation reaction in the presence of a base. Here, the starting materials and the auxiliary base are advantageously employed in equimolar amounts. A slight excess of the auxiliary base, for example from 45 1.2 to 1.5 molar equivalents, based on VII, may be advantageous in certain cases.

Suitable auxiliary bases are tertiary alkyl amines, pyridine or alkali metal carbonates. Suitable solvents are, for example, chlorinated hydrocarbons, such as methylene chloride or 1,2-dichloroethane, aromatic hydrocarbons, such as toluene, 5 xylene or chlorobenzene, ethers, such as diethyl ether, methyl tert-butyl ether, tetrahydrofuran or dioxane, polar aprotic solvents, such as acetonitrile, dimethylformamide or dimethyl sulfoxide, or esters, such as ethyl acetate, or mixtures of these.

10

If the activated carboxylic acid component employed is a benzoyl halide, it may be advantageous to cool the reaction mixture to 0–10°C on addition of this reaction partner. The mixture is subsequently stirred at 20 – 100°C, preferably at 25 – 50°C, until 15 the reaction is complete. Work-up is carried out in a customary manner, for example the reaction mixture is poured into water and the product of value is extracted. Solvents which are suitable for this purpose are, in particular, methylene chloride, diethyl ether and ethyl acetate. The organic phase is dried and the 20 solvent is removed, after which the crude ester can be employed without any further purification for the rearrangement.

The rearrangement of the esters to the compounds of the formula III is advantageously carried out at 20 – 100°C in a solvent and 25 in the presence of a base and, if appropriate, with the aid of a cyano compound as catalyst.

Suitable solvents are, for example, acetonitrile, methylene 30 chloride, 1,2-dichloroethane, dioxane, ethyl acetate, toluene or mixtures of these. Preferred solvents are acetonitrile and dioxane.

Suitable bases are tertiary amines, such as triethylamine, 35 aromatic amines, such as pyridine, or alkali metal carbonates, such as sodium carbonate or potassium carbonate, which are preferably employed in an equimolar amount, or up to a four-fold excess, based on the ester. Preference is given to using triethylamine or alkali metal carbonate, preferably in twice the 40 equimolar amount, based on the ester.

Suitable cyano compounds are inorganic cyanides, such as sodium 45 cyanide or potassium cyanide, and organic cyano compounds, such as acetone cyanohydrin or trimethylsilyl cyanide. They are employed in an amount from 1 to 50 mol percent, based on the ester. Preference is given to using acetone cyanohydrin or

trimethylsilyl cyanide, for example in an amount from 5 to 15, preferably 10, mol percent, based on the ester.

5 Work-up can be carried out in a manner known per se. For example, the reaction mixture is acidified with dilute mineral acid, such as 5% strength hydrochloric acid, or sulfuric acid, and extracted with an organic solvent, for example methylene chloride or ethyl acetate. The organic extract can be extracted with 5-10% strength alkali metal carbonate solution, for example sodium carbonate or 10 potassium carbonate solution. The aqueous phase is acidified and the resulting precipitate is filtered off with suction and/or extracted with methylene chloride or ethyl acetate, dried and concentrated.

15 20 The benzoyl halides of the formula VIIa (where  $L^2 = Cl, Br$ ) can be prepared in a manner known per se by reaction of the benzoic acids of the formula VIIb with halogenating agents, such as thionyl chloride, thionyl bromide, phosgene, diphosgene, triphosgene, oxalyl chloride, oxalyl bromide.

25 The benzoic acids of the formula VIIb can be prepared in a known manner from the corresponding esters by acidic or basic hydrolysis. The latter are known from the literature or can be prepared in a manner known per se.

30 8-Difluoromethyl-5-alkoxycarbonyl-quinolines can be obtained from the corresponding 8-aldehyde derivatives by fluorination. A suitable fluorinating agent is, inter alia, DAST. The formyl quinoline is obtained by oxidation of the corresponding bromomethyl quinoline.

35 Furthermore, it is possible to obtain 8-difluoromethoxy-5-alkoxycarbonyl-quinolines from the corresponding 8-hydroxy derivatives by reaction with chlorodifluoromethane. This reaction is preferably carried out in the presence of a base, such as potassium hydroxide or sodium hydroxide, in an aprotic solvent. The 8-hydroxy-5-alkoxycarbonylquinolines are obtained from 40 8-hydroxy-5-hydroxycarbonyl-quinoline by esterification reactions which are known per se.

## Preparation examples:

2-[(8-Chloroquinolin-5-yl)carbonyl]-1-chloro-4,4,6,6-tetramethylcyclohex-1-ene-3,5-dione (Compound 2.22) and

5 2-[(8-chloroquinolin-5-yl)chloromethylidene]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione (Compound 3.1)

4.0 g (10.8 mmol) of 2-(8-chloroquinolin-5-yl)carbonyl-4,4,6,6-tetramethylcyclohexane-1,3,5-trione were dissolved in 40 ml of dichloromethane, and 4.1 g (32.4 mmol) of oxalyl chloride and 1.5 ml of dimethylformamide were added. The mixture was stirred at 25°C for 1.5 hours, after which the solvent was removed. This gave 3.9 g of colorless crystals. Silica gel chromatography (mobile phase: toluene/methyl-tert-butyl ether) gave:

2-[(8-chloroquinolin-5-yl)carbonyl]-1-chloro-4,4,6,6-tetramethylcyclohex-1-ene-3,5-dione: Yield 0.65 g (colorless crystals); m.p.: 180°C;

2-[(8-chloroquinolin-5-yl)chloromethylidene]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione: Yield: 0.35 g (colorless crystals); m.p.: 156°C.

25 2-[(8-Chloroquinolin-5-yl)-1-(4'-oxo-1',4'-dihydropyrid-1'-yl)-4,4,6,6-tetramethylcyclohex-1-ene-3,5-dione (Compound 2.46) and 2-[(8-chloroquinolin-5-yl)-(4'-oxo-1',4'-dihydropyrid-1'-yl)-methylidene]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione (Compound 3.5)

30 1.0 g (2.6 mmol) of a mixture of the compounds 2.22 and 3.1 was dissolved in 25 ml of methylene chloride, 0.82 g (8.7 mmol) of 4-hydroxypyridine were added and the mixture was stirred at 40°C for 8 hours. Insoluble components were subsequently filtered off, the solvent was removed and the residue was chromatographed over 35 silica gel (mobile phase: methylene chloride/methanol). This gave: 2-[(8-chloroquinolin-5-yl)-4'-oxo-1',4'-dihydropyridin-1'-yl)methylidene]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione: Yield 0.40 g (colorless oil);

2-[(8-chloroquinolin-5-yl)carbonyl]-1-(4'-oxo-1',4'-dihydro-40 pyrid-1'-yl)-4,4,6,6-tetramethylcyclohex-1-ene-3,5-dione: Yield 0.25 g (colorless crystals); m.p. > 210°C.

2-(8-fluoroquinolin-5-yl)carbonyl-1,5-di(ethoxycarbonyloxy)-4,4,6,6-tetramethylcyclohex-1-ene-3,5-dione (Compound 3.20)

0.12 g (4 mmol) of sodium hydride was dissolved in 10 ml of tetrahydrofuran, 0.36 g (1 mmol) of 2-[(8-fluoroquinolin-5-yl)carbonyl]-4,4,6,6-tetramethyl-1-hydroxy-cyclohexane-3,5-dione in 5 ml of tetrahydrofuran was 5 added dropwise at room temperature and the mixture was stirred at 40°C for 1 hour. At room temperature, 0.43 g (4 mmol) of ethyl chloroformate were subsequently added dropwise, and the mixture was heated under reflux for 3 hours. After cooling, water was 10 added and the mixture was extracted with ethyl acetate, the organic phase was washed with 2% strength potassium carbonate solution and water and dried and the solvent was removed. This gave 0.45 g of a colorless oil).

2-[(8-Chloroquinolin-5-yl)carbonyl]-1-[(dimethylamino)carbonyl-thio]-4,4,6,6-tetramethyl-cyclo-hex-1-ene-3,5-dione (Compound 2.45) and  
2-[(8-chloroquinolin-5-yl)-[(dimethylamino)carbonylthio]-methylidene]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione (Compound 3.4)

20 0.50 g (1.3 mmol) of 2-[(8-chloroquinolin-5-yl)carbonyl]-4,4,6,6-tetramethyl-cyclohexane-1,3,5-trione was dissolved in 15 ml of tetrahydrofuran, 0.52 g (5.2 mmol) of triethylamine was added and 0.32 g (2.6 mmol) of dimethylaminothiocarbonyl chloride 25 in 5 ml of tetrahydrofuran was added dropwise. The mixture was stirred at room temperature for 30 hours, the solvent was removed, and the residue was taken up in the ethyl acetate, washed with 5% strength potassium carbonate solution and water, dried, concentrated and chromatographed over silica gel using 30 cyclohexane/ethyl acetate. This gave  
2-[(8-chloroquinolin-5-yl)carbonyl]-1-[(dimethylamino)carbonyl-thio]-4,4,6,6-tetramethyl-cyclohex-1-ene-3,5-dione: Yield 0.5 g (colorless crystals); m.p. 138°C;  
35 2-[(8-chloroquinolin-5-yl)-[(dimethylamino)carbonyl-thio]methylidene]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione: Yield: 0.2 g (colorless crystals) m.p. 75°C.

2-[(8-difluoromethylquinolin-5-yl)carbonyl]-1-chloro-4,4,6,6-40 tetramethyl-cyclohex-1-ene-3,5-dione (Compound 2.31)

Step a) Methyl 8-formyl-5-quinolinecarboxylate

45 28.8 g (103 mmol) of 8-(bromomethyl)-5-quinolinecarboxylate were dissolved in 200 ml of acetonitrile, 36.1 g (309 mmol) of N-methylmorpholine N-oxide were added, the mixture was stirred at 25°C for 7 hours and the solvent was then removed. Silica gel

chromatography (mobile phase: cyclohexane/ethyl acetate) gave 12.0 g of methyl 8-formyl-5-quinolinecarboxylate (colorless crystals), m.p.: 128°C.

5 Step b) 8-difluoromethyl-5-quinolinecarboxylate

0.5 g (2.3 mmol) of methyl 8-formyl-5-quinolinecarboxylate was dissolved in 50 ml of dichloroethane and, at -20°C, 1.1 g (6.8 mmol) of diethylaminosulfur trifluoride (DAST) were added dropwise. The mixture was stirred at -20°C for 30 min and then warmed to 25°C, and 50 ml of water were added dropwise. The aqueous phase was extracted with methylene chloride, the combined organic phases were washed with sodium bicarbonate solution and dried and the solvent was removed. Yield: 0.7 g of colorless crystals;

<sup>1</sup>H-NMR (δ in ppm, d<sup>6</sup>-DMSO): 9.28 (d, 1H); 9.04 (s, 1H); 8.36 (d, 1H); 8.11 (d, 1H); 7.90 (t, 1H); 7.80 (brd s, 1H); 3.96 (s, 3H).

20 Step c) 8-difluoromethyl-5-quinolinecarboxylic acid

0.5 g (2.0 mmol) of methyl 8-difluoromethyl-5-quinolinecarboxylate was dissolved in 5 ml of ethanol, 0.43 g (10.5 mmol) of sodium hydroxide and 1 ml of water were added, and the mixture was stirred at 25°C for 20 hours. The solvents were subsequently removed, the residue was taken up in water, washed twice with methylene chloride and adjusted to pH 1 using 10 N hydrochloric acid, and the precipitate was filtered off with suction. Drying gave 0.5 g of 8-difluoromethyl-5-quinolinecarboxylic acid (colorless crystals);

<sup>1</sup>H-NMR (δ in ppm, d<sup>6</sup>-DMSO): 9.35 (d, 1H); 9.04 (s, 1H); 8.38 (d, 1H); 8.10 (d, 1H); 7.92 (t, 1H); 7.78 (brd s, 1H).

35 Step d) 2-[(8-difluoromethylquinolin-5-yl)carbonyl]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione

0.26 g (1.4 mmol) of 2,2,4,4-tetramethylcyclohexane-1,3,5-trione was dissolved in 10 ml of acetonitrile, 0.34 g (1.4 mmol) of 8-difluoromethyl-5-quinolinecarboxylic acid and 0.38 g (1.9 mmol) of dicyclohexylcarbodiimide were added and the mixture was stirred at 25°C for 17 hours. 0.57 g (5.6 mmol) of triethylamine and 5 drops of trimethylsilyl cyanide were then added to the suspension, and stirring was continued at 25°C for a further 25 hours. 50 ml of 5% strength potassium carbonate solution were subsequently added, the mixture was filtered, the filtrate was washed with methyl tert-butyl ether, the aqueous phase was

adjusted to pH 2 using concentrated hydrochloric acid and the precipitate was filtered off, washed with water and dried. Yield: 0.25 g (colorless crystals);  
<sup>1</sup>H-NMR ( $\delta$  in ppm, CDCl<sub>3</sub>): 17.5 (s, 1H); 9.02 (q, 1H); 8.24 (d, 1H); 5 8.06 (d, 1H); 7.82 (t, 1H); 7.50 (m, 2H); 1.60 (s, 6H); 1.36 (s, 6H).

Step e) 2-[(8-Difluoromethylquinolin-5-yl)carbonyl]-1-chloro-  
10 4,4,6,6-tetramethyl-cyclohex-1-ene-3,5-dione (Compound  
2.31)

0.25 g (0.65 mmol) of 2-(8-difluoromethylquinolin-5-yl)carbonyl-  
4,4,6,6-tetramethyl-cyclohexane-1,3,5-trione was dissolved in  
15 15 ml of dichloromethane and 0.25 g (1.95 mmol) of oxalyl  
chloride and 7 drops of dimethylformamide were added. The mixture  
was stirred at 25°C for 17 hours, after which the solvent was  
removed. This gave 0.2 g of colorless crystals.

20 Preparation of the precursor 2-[(8-difluoromethoxyquinolin-5-yl)carbonyl]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione

Step a) Methyl 8-hydroxy-5-quinolincarboxylate

25 16.25 g (86 mmol) of 8-hydroxy-5-quinolincarboxylic acid were dissolved in 70 ml of methanol, 3 ml of concentrated sulfuric acid were added and the mixture was heated under reflux for 25 hours. The solvent was then removed and the residue was taken up in ice-water, adjusted to a pH of 8 using sodium carbonate  
30 solution and filtered hot. The residue was extracted with methyl-tert-butyl ether for 7 hours on a jacketed Soxhlet extractor, and the solvent was subsequently removed from the extract. This gave 6.8 g of a brown powder;  
<sup>1</sup>H-NMR ( $\delta$  in ppm, d<sup>6</sup>-DMSO): 9.38 (d, 1H); 8.90 (d, 1H); 8.26 (d, 1H); 7.71 (dd, 1H); 7.15 (d, 1H); 3.93 (s, 3H).

Step b) Methyl 8-difluoromethoxy-5-quinolincarboxylate

40 1.0 g (5.0 mmol) of methyl 8-hydroxy-5-quinolincarboxylate was dissolved in 20 ml of dimethylformamide, 0.76 g (5.5 mmol) of potassium carbonate was added and 14 g of chlorodifluoromethane were introduced at 40°C over a period of 2 hours. Solid components were then filtered off, the solvent was removed and the residue  
45 was washed with water and dried. This gave 0.75 g of a brown powder;

<sup>1</sup>H-NMR ( $\delta$  in ppm, CDCl<sub>3</sub>): 9.45 (d, 1H); 9.00 (d, 1H); 8.30 (d, 1H); 7.61 (dd, 1H); 7.49 (d, 1H); 7.18 (t, 1H); 3.99 (s, 3H).

Step c) 8-difluoromethoxy-5-quinolinecarboxylic acid

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0.7 g (2.8 mmol) of methyl 8-difluoromethoxy-5-quinolinecarboxylate was suspended in 15 ml of water and 0.4 g (10 mmol) of sodium hydroxide was added. The mixture was stirred at 25°C for 20 hours and then filtered off, and the filtrate was washed with methyl tert-butyl ether. The aqueous phase was adjusted to pH 3 using concentrated hydrochloric acid and filtered off, and the residue was dried. This gave 0.45 g of a colorless powder;  
<sup>1</sup>H-NMR ( $\delta$  in ppm, d<sup>6</sup>-DMSO): 13.5 (br, 1H); 9.39 (d, 1H); 9.03 (d, 1H); 8.32 (d, 1H); 7.78 (dd, 1H); 7.62 (d, 1H); 7.60 (t, 1H).

15

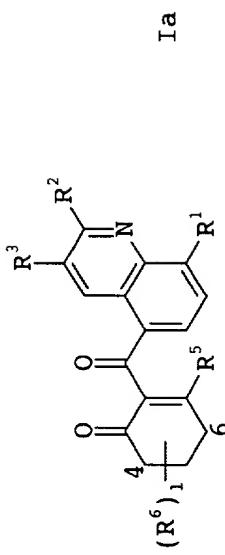
Step d) 2-[(8-difluoromethoxyquinolin-5-yl)carbonyl]-4,4,6,6-tetramethylcyclohexane-1,3,5-trione

20 0.4 g (1.7 mmol) of 8-difluoromethoxy-5-quinolinecarboxylic acid was dissolved in 20 ml of acetonitrile, 0.4 g (1.9 mmol) of N,N-dicyclohexylcarbodiimide and 0.3 g (1.7 mmol) of 2,2,4,4-tetramethylcyclohexane-1,3,5-trione were added and the mixture was stirring at 25°C for 20 hours. 0.4 g (4.0 mmol) of 25 triethylamine and 2 drops of trimethylsilyl cyanide were then added, and stirring was continued at 30-35°C for a further 3 hours. The precipitate was filtered off, and the filtrate was concentrated, 20 ml of 5% strength potassium carbonate solution were added and the mixture was washed with methyl tert-butyl ether. The aqueous phase was subsequently adjusted to pH 3 using concentrated hydrochloric acid and extracted with ethyl acetate. The solvent was removed and the residue was chromatographed over silica gel (mobile phase: methylene chloride/methanol). This gave 0.2 g of a colorless powder;  
30 35 <sup>1</sup>H-NMR ( $\delta$  in ppm, CDCl<sub>3</sub>): 16.5 (br, 1H); 9.02 (d, 1H); 8.30 (d, 1H); 7.51 (m, 2H); 7.21 (d, 1H); 7.17 (t, 1H); 1.60 (s, 6H); 1.35 (s, 6H).

40 In addition to the cyclohexenone quinolinoyl derivatives of the formula I described above, further derivatives which were prepared or are preparable in a similar manner or in a manner known per se are listed in Tables 2 and 3:

45

Table 2:



No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	(R <sup>6</sup> ) <sub>1</sub>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
2.1	F	H	H	OCOC <sub>6</sub> H <sub>5</sub>	4, 4, 6, 6-((CH <sub>3</sub> ) <sub>4</sub> -5-oxo	178
2.2	F	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>	4, 4, 6, 6-((CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.22 (d, 1H); 9.03 (d, 1H); 7.98 (q, 1H); 7.62 (q, 1H); 7.39 (t, 1H); 1.49 (s, 6H); 1.40 (s, 6H); 1.11 (s, 9H)
2.3	Cl	H	H	OCOC <sub>6</sub> H <sub>5</sub>	4, 4, 6, 6-((CH <sub>3</sub> ) <sub>4</sub> -5-oxo	>200
2.4	Cl	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>	4, 4, 6, 6-((CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.20 (dd, 2H); 8.85 (q, 2H); 7.60 (q, 1H); 1.40 (s, 12H); 1.12 (s, 9H)
2.5	CH <sub>3</sub>	H	H	OPS(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>	4, 4, 6, 6-((CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.50 (d, 1H); 8.98 (d, 1H); 8.06 (d, 1H); 7.60 (m, 2H); 3.95 (m, 4H); 2.90 (s, 3H); 1.65 (s, 6H); 1.51 (s, 6H)
2.6	CH <sub>3</sub>	H	H	OCOSCH <sub>3</sub>	4, 4, 6, 6-((CH <sub>3</sub> ) <sub>4</sub> -5-oxo	128
2.7	CH <sub>3</sub>	H	H	OCSN(CH <sub>3</sub> ) <sub>2</sub>	4, 4, 6, 6-((CH <sub>3</sub> ) <sub>4</sub> -5-oxo	163

NO.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	(R <sup>6</sup> ) <sub>1</sub>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
2.8	CH <sub>3</sub>	H	H	OCOC <sub>6</sub> H <sub>5</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	9.05 (d, 1H); 9.85 (d, 1H); 7.92 (d, 1H); 7.72 (d, 2H); 7.51 (d, 1H); 7.48 (t, 1H); 7.35 (q, 1H); 7.28 (t, 2H); 2.79 (s, 3H); 1.62 (s, 6H); 1.55 (s, 6H)
2.9	CH <sub>3</sub>	H	H	OPO <sub>3</sub> (CH <sub>3</sub> ) <sub>2</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	9.41 (d, 1H); 8.95 (d, 1H); 8.07 (d, 1H); 7.58 (d, 1H); 7.50 (q, 1H); 2.88 (s, 3H); 2.45 (s, 6H); 2.42 (s, 6H); 1.65 (s, 6H); 1.48 (s, 6H)
2.10	CH <sub>3</sub>	H	H	OCO(CH <sub>2</sub> ) <sub>3</sub> O(2,4-Cl <sub>2</sub> -C <sub>6</sub> H <sub>3</sub> )	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	oil
2.11	CH <sub>3</sub>	H	H	OCOCH(CH <sub>3</sub> )O(2-CH <sub>3</sub> -4-Cl-C <sub>6</sub> H <sub>3</sub> )	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	oil
2.12	CH <sub>3</sub>	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	9.20 (d, 1H); 8.85 (d, 1H); 7.80 (d, 1H); 7.51 (d, 1H); 7.48 (q, 1H); 2.85 (s, 3H); 1.55 (s, 6H); 1.50 (s, 6H); 1.08 (s, 9H)
2.13	F	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>	4,4,6-(CH <sub>3</sub> ) <sub>3</sub>	oil
2.14	C1	H	H	OCOCH <sub>2</sub> CH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	9.13 (d, 1H); 9.02 (d, 1H); 7.85 (s, 2H); 7.58 (q, 1H); 2.40 (q, 2H); 1.60 (s, 6H); 1.50 (s, 6H); 1.05 (t, 3H)
2.15	F	H	H	OCCOSCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-(OH)	190-192
2.16	C1	H	H	OCCOSCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	84
2.17	F	H	H	OCCOSCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-Oxo	72

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	(R <sup>6</sup> ) <sub>1</sub>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
2.18	CH <sub>3</sub>	H	H	OCH <sub>3</sub>	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.44 (d, 1H); 9.03 (d, 1H); 7.88 (d, 1H); 7.59 (m, 2H); 3.92 (s, 3H); 2.90 (s, 3H); 1.50 (s, 6H); 1.38 (s, 6H)
2.19	F	H	H	OSO <sub>2</sub> CH <sub>3</sub>	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-(OH)	9.30 (d, 1H); 9.02 (d, 1H); 7.93 (q, 1H); 7.61 (q, 1H); 7.40 (q, 1H); 3.01 (s, 3H); 1.57 (s, 3H); 1.53 (s, 3H); 1.32 (s, 3H); 1.28 (s, 3H)
2.20	F	H	H	OOCOCH <sub>2</sub> CH <sub>3</sub>	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-(OCOOCH <sub>2</sub> CH <sub>3</sub> )	9.18 (d, 1H); 9.02 (s, 1H); 7.92 (q, 1H); 7.65 (q, 1H); 7.41 (q, 1H); 4.32 (q, 2H); 4.11 (q, 1H); 1.45 (s, 3H); 1.40 (s, 3H); 1.38 (s, 3H); 1.30 (s, 3H); 1.22 (s, 3H); 1.15 (s, 3H)
2.21	F	H	H	OCH <sub>3</sub>	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.45 (d, 1H); 9.03 (d, 1H); 7.96 (q, 1H); 7.68 (q, 1H); 7.40 (t, 1H); 3.88 (s, 3H); 1.50 (s, 6H); 1.39 (s, 6H)
2.22	C1	H	H	C1	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	180
2.23	F	H	H	C1	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	152
2.24	C1	H	H	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	119
2.25	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )	H	H	S(4-CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> )	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	132-135
2.26	C1	H	H	C1	4,4',6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	(R <sup>6</sup> ) <sub>1</sub>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
2.27	O(te-tetrahy-drofu-ran-3-Y1)	H	H	C1	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.65 (d, 1H); 9.05 (d, 1H); 8.83 (d, 1H); 7.66 (q, 1H); 6.95 (d, 1H); 5.23 (m, 1H); 4.21 (d, 2H); 4.05 (m, 2H); 2.39 (m, 2H); 1.62 (s, 6H); 1.48 (s, 6H)
2.28	CH <sub>3</sub>	H	H	C1	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	1.94
2.29	F	H	H	C1	4,4,6-(CH <sub>3</sub> ) <sub>3</sub>	oil
2.30	CH <sub>3</sub>	H	H	Br	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	oil
2.31	CHF <sub>2</sub>	H	H	C1	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.40 (d, 1H); 9.05 (d, 1H); 8.05 (d, 1H); 7.86 (t, 1H); 7.80 (d, 1H); 7.65 (q, 1H); 1.59 (s, 6H); 1.48 (s, 6H)
2.32	CF <sub>3</sub>	H	H	C1	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	oil
2.33	CF <sub>3</sub>	CH <sub>3</sub>	H	C1	5,5-(CH <sub>3</sub> ) <sub>2</sub>	9.15 (d, 1H); 8.10 (d, 1H); 7.75 (d, 1H); 7.52 (d, 1H); 3.02 (s, 2H); 2.91 (s, 2H); 2.80 (s, 3H); 1.20 (s, 6H)
2.34	CH <sub>3</sub>	H	H	N(CH <sub>3</sub> )OCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	oil
2.35	CH <sub>3</sub>	H	H	SCCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.50 (d, 1H); 9.02 (d, 1H); 7.80 (d, 1H); 7.50 (m, 3H); 2.90 (s, 3H); 2.30 (s, 3H); 1.50 (s, 6H); 1.35 (s, 3H); 1.25 (s, 3H)
2.36	C1	H	H	1-pyrazolyl	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.30 (d, 1H); 9.05 (d, 1H); 7.61 (q, 1H); 7.52 (d, 1H); 7.40 (s, 1H); 6.11 (s, 1H); 1.65 (s, 3H); 1.60 (s, 3H); 1.50 (s, 6H)
2.37	C1	H	H	N(CH <sub>3</sub> )OCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	190

NO.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	(R <sup>6</sup> ) <sub>1</sub>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
2.38	CH <sub>3</sub>	H	H	1-pyrolidinyl	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	oil
2.39	CH <sub>3</sub>	H	H	4-morpholinyl	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	205
2.40	C1	H	H	4-morpholinyl	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	205
2.41	CH <sub>3</sub>	H	H	C1	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	194
2.42	CH <sub>3</sub>	H	H	1-pyrazolyl	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	150
2.43	CF <sub>3</sub>	H	H	4-morpholinyl	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	oil
2.44	CHNOCH <sub>3</sub>	H	H	C1	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	oil
2.45	C1	H	H	SCON(CH <sub>3</sub> ) <sub>2</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	138
2.46	C1	H	H	4-oxo-1,4-dihydro-pyrid-1-yl	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	>210
2.47	F	H	H	C1	4,6-(CH <sub>3</sub> ) <sub>2</sub> -4-SCH <sub>3</sub>	oil
2.48	CH <sub>3</sub>	H	H	SCON(CH <sub>3</sub> ) <sub>2</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	166
2.49	CH <sub>3</sub>	H	H	OP(OCH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.65 (d, 1H); 8.97 (d, 1H); 7.79 (d, 1H); 7.60 (m, 2H); 4.00 (m, 4H); 2.91 (s, 3H); 1.71 (s, 6H); 1.51 (s, 6H)
2.50	OCH <sub>3</sub>	H	H	C1	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.65 (d, 1H); 9.01 (d, 1H); 7.83 (d, 1H); 7.65 (q, 1H); 7.02 (d, 1H); 4.18 (s, 3H); 1.65 (s, 6H); 1.55 (s, 6H)

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	(R <sup>6</sup> ) <sub>1</sub>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
2.51	F	H	H	OCOS(CH <sub>2</sub> ) <sub>7</sub> CH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	9.20 ((d, 1H); 9.02 (d, 1H); 7.89 (q, 1H); 7.60 (q, 1H); 7.40 (t, 1H); 2.62 (t, 2H); 1.55 (s, 6H); 1.48 (s, 6H); 1.1-1.5 (m, 12H); 0.85 (t, 3H))
2.52	F	H	H	C1	4,6-(ethan-1,2-diy) <sup>1</sup>	9.55 (d, 1H); 9.02 (d, 1H); 7.78 (q, 1H); 7.65 (q, 1H); 7.40 (t, 1H); 3.24 (m, 1H); 3.17 (m, 1H); 2.41 (d, 1H); 1.8-2.4 (m, 5H))
2.53	SCH <sub>3</sub>	H	H	OCOSCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	147
2.54	F	H	H	OCOSCH <sub>2</sub> CH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	107
2.55	Br	H	H	OCOC(CH <sub>3</sub> ) <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	134
2.56	Br	H	H	OCO(C <sub>6</sub> H <sub>5</sub> )	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	228
2.57	C1	H	H	F	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	181
2.58	F	H	H	SO <sub>2</sub> CH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	206
2.59	F	H	H	SOCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	190
2.60	SCH <sub>2</sub> F	H	H	F	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	9.50 (d, 1H); 9.00 (d, 1H); 7.81 (s, 2H); 7.65 (g, 1H); 6.01 (d, 2H); 1.60 (s, 6H); 1.51 (s, 6H)
2.61	F	H	H	SC <sub>6</sub> H <sub>5</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	65
2.62	F	H	H	SO <sub>2</sub> C <sub>6</sub> H <sub>5</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	111
2.63	F	H	H	SCH <sub>3</sub>	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	143
2.64	CHF <sub>2</sub>	H	H	F	4,4,6,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	183

No.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	(R <sup>6</sup> ) <sub>1</sub>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
2.65	C1	CHF <sub>2</sub>	H	F	4,4,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	173
2.66	F	H	H	F	4,4,6-(CH <sub>3</sub> ) <sub>4</sub> -5-OXO	153

1) R<sup>4</sup> = 4-Oxo-(bicyclo[3.2.1]oct-2-en-3-yl)carbonyl

Ib

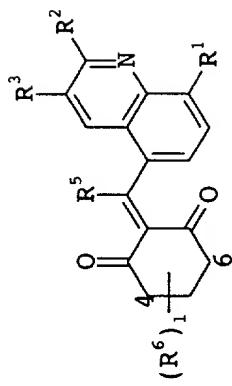


Table 3:

NO.	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>	R <sup>5</sup>	R <sup>6</sup>	m.p. [°C] or <sup>1</sup> H-NMR [ppm]
3.1	C1	H	H	C1	4, 4, 6, 6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	156
3.2	CH <sub>3</sub>	H	H	1-(1, 2, 4-triazo-1-yl)	4, 4, 6, 6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.00 (d, 1H); 8.09 (s, 1H); 7.82 (d, 1H); 7.72 (s, 1H); 7.68 (d, 1H); 7.47 (d, 1H); 7.35 (q, 1H); 2.95 (s, 3H); 1.55 (s, 6H); 1.30 (s, 6H)
3.3	C1	H	H	4-morpholinyl	4, 4, 6, 6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.15 (d, 1H); 8.32 (d, 1H); 7.82 (d, 1H); 7.60 (q, 1H); 7.45 (d, 1H); 4.05 (m, 2H); 3.68 (m, 4H); 3.35 (m, 1H); 3.25 (m, 1H); 1.30 (s, 6H); 1.22 (s, 6H)
3.4	C1	H	H	SCON(CH <sub>3</sub> ) <sub>2</sub>	4, 4, 6, 6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	75
3.5	C1	H	H	4-oxo-1, 4-dihydro- pyrid-1-yl	4, 4, 6, 6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	9.02 (d, 1H); 8.42 (d, 1H); 7.80 (2d, 3H); 7.50 (q, 1H); 7.38 (d, 1H); 6.72 (d, 2H); 1.50 (s, 12H)
3.6	C1	H	H	N(CH <sub>3</sub> ) <sub>2</sub>	4, 4, 6, 6-(CH <sub>3</sub> ) <sub>4</sub> -5-oxo	190

The compounds of the formula I and their agriculturally useful salts are suitable, both in the form of isomer mixtures and in the form of the pure isomers, as herbicides. The herbicidal 5 compositions comprising compounds of the formula I control vegetation on non-crop areas very efficiently, especially at high rates of application. They act against broad-leaved weeds and harmful grasses in crops such as wheat, rice, maize, soya and cotton without causing any significant damage to the crop plants. 10 This effect is mainly observed at low rates of application.

Depending on the application method used, the compounds of the formula I, or the compositions comprising them, can additionally be employed in a further number of crop plants for eliminating 15 undesirable plants. Examples of suitable crops are the following:

Allium cepa, Ananas comosus, Arachis hypogaea, Asparagus officinalis, Beta vulgaris spec. altissima, Beta vulgaris spec. rapa, Brassica napus var. napus, Brassica napus var. 20 napobrassica, Brassica rapa var. silvestris, Camellia sinensis, Carthamus tinctorius, Carya illinoinensis, Citrus limon, Citrus sinensis, Coffea arabica (Coffea canephora, Coffea liberica), Cucumis sativus, Cynodon dactylon, Daucus carota, Elaeis guineensis, Fragaria vesca, Glycine max, Gossypium hirsutum, 25 (Gossypium arboreum, Gossypium herbaceum, Gossypium vitifolium), Helianthus annuus, Hevea brasiliensis, Hordeum vulgare, Humulus lupulus, Ipomoea batatas, Juglans regia, Lens culinaris, Linum usitatissimum, Lycopersicon lycopersicum, Malus spec., Manihot esculenta, Medicago sativa, Musa spec., Nicotiana tabacum 30 (N.rustica), Olea europaea, Oryza sativa, Phaseolus lunatus, Phaseolus vulgaris, Picea abies, Pinus spec., Pisum sativum, Prunus avium, Prunus persica, Pyrus communis, Ribes sylvestre, Ricinus communis, Saccharum officinarum, Secale cereale, Solanum tuberosum, Sorghum bicolor (s. vulgare), Theobroma cacao, 35 Trifolium pratense, Triticum aestivum, Triticum durum, Vicia faba, Vitis vinifera and Zea mays.

In addition, the compounds of the formula I may also be used in crops which tolerate the action of herbicides owing to breeding, 40 including genetic engineering methods.

The compounds of the formula I, or the herbicidal compositions comprising them, can be used for example in the form of ready-to-spray aqueous solutions, powders, suspensions, also 45 highly-concentrated aqueous, oily or other suspensions or dispersions, emulsions, oil dispersions, pastes, dusts, materials for broadcasting or granules, by means of spraying, atomizing,

dusting, broadcasting or watering. The use forms depend on the intended aims; in any case, they should guarantee a very fine distribution of the active compounds according to the invention.

5 The herbicidal compositions comprise a herbicidally effective amount of at least one compound of the formula I or of an agriculturally useful salt of I, and auxiliaries which are customary for the formulation of crop protection agents.

10 Essentially, suitable inert auxiliaries include: mineral oil fractions of medium to high boiling point, such as kerosene and diesel oil, furthermore coal tar oils and oils of vegetable or animal origin, aliphatic, cyclic and aromatic hydrocarbons, e.g. paraffin, tetrahydronaphthalene, alkylated 15 naphthalenes and their derivatives, alkylated benzenes and their derivatives, alcohols such as methanol, ethanol, propanol, butanol and cyclohexanol, ketones such as cyclohexanone, or strongly polar solvents, e.g. amines such as N-methylpyrrolidone, and water.

20 Aqueous use forms can be prepared from emulsion concentrates, suspensions, pastes, wettable powders or water-dispersible granules by adding water. To prepare emulsions, pastes or oil dispersions, the cyclohexenonequinolinoyl derivatives of the 25 formula I, either as such or dissolved in an oil or solvent, can be homogenized in water by means of a wetting agent, tackifier, dispersant or emulsifier. Alternatively, it is possible to prepare concentrates comprising active substance, wetting agent, tackifier, dispersant or emulsifier and, if desired, solvent or 30 oil, which are suitable for dilution with water.

Suitable surfactants are the alkali metal salts, alkaline earth metal salts and ammonium salts of aromatic sulfonic acids, e.g. ligno-, phenol-, naphthalene- and dibutynaphthalenesulfonic 35 acid, and of fatty acids, alkyl- and alkylarylsulfonates, alkyl sulfates, lauryl ether sulfates and fatty alcohol sulfates, and salts of sulfated hexa-, hepta- and octadecanols, and also of fatty alcohol glycol ethers, condensates of sulfonated naphthalene and its derivatives with formaldehyde, condensates of 40 naphthalene, or of the naphthalenesulfonic acids with phenol and formaldehyde, polyoxyethylene octylphenol ether, ethoxylated isooctyl-, octyl- or nonylphenol, alkylphenyl or tributylphenyl polyglycol ether, alkylaryl polyether alcohols, isotridecyl alcohol, fatty alcohol/ethylene oxide condensates, ethoxylated 45 castor oil, polyoxyethylene alkyl ethers or polyoxypropylene alkyl ethers, lauryl alcohol polyglycol ether acetate, sorbitol esters, lignin-sulfite waste liquors or methylcellulose.

Powders, materials for broadcasting and dusts can be prepared by mixing or grinding the active substances together with a solid carrier.

5 Granules, e.g. coated granules, impregnated granules and homogeneous granules, can be prepared by binding the active compounds to solid carriers. Solid carriers are mineral earths, such as silicas, silica gels, silicates, talc, kaolin, limestone, lime, chalk, bole, loess, clay, dolomite, diatomaceous earth, 10 calcium sulfate, magnesium sulfate, magnesium oxide, ground synthetic materials, fertilizers such as ammonium sulfate, ammonium phosphate and ammonium nitrate, ureas, and products of vegetable origin, such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders, or other solid carriers.

15 The concentrations of the compounds of the formula I in the ready-to-use preparations can be varied within wide ranges. In general, the formulations comprise from about 0.001 to 98% by weight, preferably 0.01 to 95% by weight of at least one active 20 compound. The active compounds are employed in a purity of from 90% to 100%, preferably 95% to 100% (according to the NMR spectrum).

The following formulation examples illustrate the production of 25 such preparations:

I. 20 parts by weight of the compound No. 2.2 are dissolved in a mixture composed of 80 parts by weight of alkylated benzene, 10 parts by weight of the adduct of 8 to 10 mol of 30 ethylene oxide to 1 mol of oleic acid N-monoethanolamide, 5 parts by weight of calcium dodecylbenzenesulfonate and 5 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and finely distributing it therein 35 gives an aqueous dispersion which comprises 0.02% by weight of the active compound.

II. 20 parts by weight of the compound No. 2.4 are dissolved in a mixture composed of 40 parts by weight of cyclohexanone, 40 30 parts by weight of isobutanol, 20 parts by weight of the adduct of 7 mol of ethylene oxide to 1 mol of isooctylphenol and 10 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and 45 finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active compound.

III. 20 parts by weight of the compound No. 2.16 are dissolved in a mixture composed of 25 parts by weight of cyclohexanone, 65 parts by weight of a mineral oil fraction of boiling point 210 to 280°C and 10 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active compound.

IV. 20 parts by weight of the compound No. 2.18 are mixed thoroughly with 3 parts by weight of sodium diisobutylnaphthalenesulfonate, 17 parts by weight of the sodium salt of a lignosulfonic acid from a sulfite waste liquor and 60 parts by weight of pulverulent silica gel, and the mixture is ground in a hammer mill. Finely distributing the mixture in 20,000 parts by weight of water gives a spray mixture which comprises 0.1% by weight of the active compound.

V. 3 parts by weight of the compound No. 2.22 are mixed with 97 parts by weight of finely divided kaolin. This gives a dust which comprises 3% by weight of the active compound.

VI. 20 parts by weight of the compound No. 2.46 are mixed intimately with 2 parts by weight of the calcium salt of dodecylbenzenesulfonate, 8 parts by weight of fatty alcohol polyglycol ether, 2 parts by weight of the sodium salt of a phenol/urea/formaldehyde condensate and 68 parts by weight of a paraffinic mineral oil. This gives a stable oily dispersion.

VII. 1 part by weight of the compound No. 3.1 is dissolved in a mixture composed of 70 parts by weight of cyclohexanone, 20 parts by weight of ethoxylated iso-octylphenol and 10 parts by weight of ethoxylated castor oil. This gives a stable emulsion concentrate.

VIII. 1 part by weight of the compound No. 3.4 is dissolved in a mixture composed of 80 parts by weight of cyclohexanone and 20 parts by weight of Wettol® EM 31 (nonionic emulsifier based on ethoxylated castor oil). This gives a stable emulsion concentrate.

The compounds of the formula I or the herbicidal compositions can be applied pre- or post-emergence. If the active compounds are less well tolerated by certain crop plants, application

techniques may be used in which the herbicidal compositions are sprayed, with the aid of the spraying equipment, in such a way that they come into contact as little as possible, if at all, with the leaves of the sensitive crop plants, while the active 5 compounds reach the leaves of undesirable plants growing underneath, or the bare soil surface (post-directed, lay-by).

The application rates of the compound of the formula I are from 0.001 to 3.0, preferably 0.01 to 1.0 kg/ha of active substance 10 (a.s.), depending on the control target, the season, the target plants and the growth stage.

To widen the activity spectrum and to achieve synergistic effects, the cyclohexenonequinolinoyl derivatives of the formula I may be mixed with a large number of representatives of other 15 herbicidal or growth-regulating active compound groups and then applied concomitantly. Suitable components for mixtures are, for example, 1,2,4-thiadiazoles, 1,3,4-thiadiazoles, amides, aminophosphoric acid and its derivatives, aminotriazoles, 20 anilides, (het)aryloxyalkanoic acids and their derivatives, benzoic acid and its derivatives, benzothiadiazinones, 2-aryl-1,3-cyclohexanediones, hetaryl aryl ketones, benzylisoxazolidinones, meta-CF<sub>3</sub>-phenyl derivatives, carbamates, quinolinecarboxylic acid and its derivatives, chloroacetanilides, 25 cyclohexenone oxime ether derivatives, diazines, dichloropropionic acid and its derivatives, dihydrobenzofurans, dihydrofuran-3-ones, dinitroanilines, dinitrophenols, diphenyl ethers, dipyridyls, halocarboxylic acids and their derivatives, ureas, 3-phenyluracils, imidazoles, imidazolinones, N-phenyl- 30 3,4,5,6-tetrahydronaphthalimides, oxadiazoles, oxiranes, phenols, aryloxy- and hetaryl oxyphenoxypropionic esters, phenylacetic acid and its derivatives, phenylpropionic acid and its derivatives, pyrazoles, phenylpyrazoles, pyridazines, pyridinecarboxylic acid and its derivatives, pyrimidyl ethers, sulfonamides, 35 sulfonylureas, triazines, triazinones, triazolinones, triazolecarboxamides and uracils.

It may furthermore be advantageous to apply the compounds of the formula I, alone or else concomitantly in combination with other 40 herbicides, in the form of a mixture with other crop protection agents, for example together with agents for controlling pests or phytopathogenic fungi or bacteria. Also of interest is the miscibility with mineral salt solutions, which are employed for treating nutritional and trace element deficiencies.

45 Non-phytotoxic oils and oil concentrates may also be added.

## Use Examples

The herbicidal activity of the cyclohexenonequinolinoyl derivatives of the formula I was demonstrated by the following 5 greenhouse experiments:

The culture containers used were plastic pots containing loamy sand with approximately 3.0% of humus as the substrate. The seeds of the test plants were sown separately for each species.

10

For the pre-emergence treatment, the active compounds, which had been suspended or emulsified in water, were applied directly after sowing by means of finely distributing nozzles. The containers were irrigated gently to promote germination and 15 growth and subsequently covered with transparent plastic hoods until the plants had rooted. This cover caused uniform germination of the test plants, unless this was adversely affected by the active compounds.

20

For the post-emergence treatment, the test plants were first grown to a height of 3 to 15 cm, depending on the plant habit, and only then treated with the active compounds which had been suspended or emulsified in water. The test plants were for this purpose either sown directly and grown in the same containers, or 25 they were first grown separately as seedlings and transplanted into the test containers a few days prior to treatment. The application rate for the post-emergence treatment was 0.25 or 0.125 kg of a.s. (active substance)/ha.

30

Depending on the species, the plants were kept at 10 - 25°C or 20 - 35°C. The test period extended over 2 to 4 weeks. During this time, the plants were tended, and their response to the individual treatments was evaluated.

35

The evaluation was carried out using a scale from 0 to 100. 100 means no emergence of the plants, or complete destruction of at least the aerial parts and 0 means no damage, or normal course of growth.

40

The plants used in the greenhouse experiments are composed of the following species:

	Scientific Name	Common Name
	<i>Abutilon theophrasti</i>	velvet leaf
5	<i>Chenopodium album</i>	lambsquarters
	<i>Galium aparine</i>	catchweed bedstraw
	<i>Ipomoea spp.</i>	morning glory
10	<i>Setaria faberi</i>	giant foxtail
	<i>Setaria viridis</i>	green foxtail
	<i>Solanum nigrum</i>	black nightshade

15 At application rates of 0.25 and 0.125 kg of a.s./ha, the compounds 2.2, 2.4 and 2.16, applied post-emergence, showed very good activity against harmful plants such as giant foxtail, green foxtail and black nightshade. Furthermore, the compounds 2.2 and 2.4 controlled velvet leaf and morning glory very efficiently.

20 Compound 2.16 additionally showed excellent activity against the weeds lambsquarters and catchweed bedstraw.

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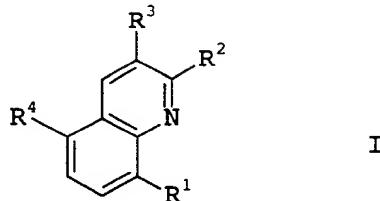
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We claim:

1. A cyclohexenonequinolinoyl derivative of the formula I

5

10



where:

15

R<sup>1</sup> is hydrogen, nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyiminomethyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, aminosulfonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminosulfonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminosulfonyl, N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino, N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl)amino, N-(C<sub>1</sub>-C<sub>6</sub>-alkyl)-N-(C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl)amino, phenoxy, heterocyclyloxy, phenylthio or heterocyclylthio, where the four last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the following substituents: nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

20

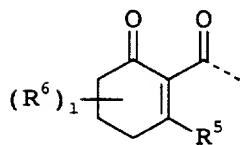
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R<sup>2</sup>, R<sup>3</sup> are hydrogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl or halogen;

35

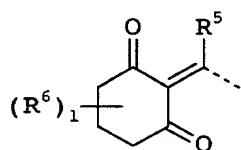
R<sup>4</sup> is a compound IIa or IIb

40



45

IIa



IIb

where

5      R<sup>5</sup>      is halogen, OR<sup>7</sup>, SR<sup>7</sup>, SOR<sup>8</sup>, SO<sub>2</sub>R<sup>8</sup>, POR<sup>8</sup>R<sup>9</sup>,  
OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup>, OPSR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup>, ONR<sup>11</sup>R<sup>12</sup>, N-linked

10     heterocyclyl or O-(N-linked heterocyclyl), where  
the heterocyclyl radical of the two last-mentioned  
substituents may be partially or fully halogenated  
and/or may carry one to three of the following  
radicals:

15     nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl,  
C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

20     R<sup>6</sup>      is nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl,  
C<sub>1</sub>-C<sub>6</sub>-haloalkyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)methyl,

25     di-(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl,  
(C<sub>1</sub>-C<sub>6</sub>-alkoxy)(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl, hydroxyl,  
C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy,  
C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyloxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio,  
C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl,  
C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl,  
C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl,  
C<sub>1</sub>-C<sub>6</sub>-haloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl or  
C<sub>1</sub>-C<sub>6</sub>-haloalkoxycarbonyl;

30     or

35     two radicals R<sup>6</sup>, which are linked to the same carbon,  
together form an -O-(CH<sub>2</sub>)<sub>m</sub>-O-, -O-(CH<sub>2</sub>)<sub>m</sub>-S-,  
-S-(CH<sub>2</sub>)<sub>m</sub>-S-, -O-(CH<sub>2</sub>)<sub>n</sub>- or -S-(CH<sub>2</sub>)<sub>n</sub> chain which  
may be substituted by one to three radicals from  
the following group:  
halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or  
C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

40     or

45     two radicals R<sup>6</sup>, which are linked to the same carbon,  
together form a -(CH<sub>2</sub>)<sub>p</sub> chain which may be  
interrupted by oxygen or sulfur and/or may be  
substituted by one to four radicals from the  
following group:  
halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or  
C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

45     or

two radicals  $R^6$ , which are linked to the same carbon, together form a methylidene group which may be substituted by one or two radicals from the following group:

5      halogen, hydroxyl, formyl, cyano,  $C_1-C_6$ -alkyl,  $C_1-C_6$ -haloalkyl,  $C_1-C_6$ -alkoxy,  $C_1-C_6$ -haloalkoxy,  $C_1-C_6$ -alkylthio,  $C_1-C_6$ -haloalkylthio,  $C_1-C_6$ -alkylsulfinyl,  $C_1-C_6$ -haloalkylsulfinyl,  $C_1-C_6$ -alkylsulfonyl or  $C_1-C_6$ -haloalkylsulfonyl;

10     or

two radicals  $R^6$ , which are linked to the same carbon, together with this carbon form a carbonyl group;

15     or

two radicals  $R^6$ , which are linked to different carbons, together form a  $-(CH_2)_n$  chain which may be substituted by one to three radicals from the following group:

20     halogen,  $C_1-C_6$ -alkyl,  $C_1-C_6$ -alkoxy, hydroxyl or  $C_1-C_6$ -alkoxycarbonyl;

25      $R^7$       is  $C_1-C_6$ -alkyl,  $C_3-C_6$ -alkenyl,  $C_3-C_6$ -haloalkenyl,  $C_3-C_6$ -alkynyl,  $C_3-C_6$ -haloalkynyl,  $C_3-C_6$ -cycloalkyl,  $C_1-C_{20}$ -alkylcarbonyl,  $C_2-C_6$ -alkenylcarbonyl,  $C_2-C_6$ -alkynylcarbonyl,  $C_3-C_6$ -cycloalkylcarbonyl,  $C_1-C_6$ -alkoxycarbonyl,  $C_3-C_6$ -alkenyloxy carbonyl,

30      $C_3-C_6$ -alkynylloxy carbonyl,  $(C_1-C_{20}$ -alkylthio)carbonyl,  $C_1-C_6$ -alkylaminocarbonyl,  $C_3-C_6$ -alkenylaminocarbonyl,  $C_3-C_6$ -alkynylaminocarbonyl,

35      $N,N$ -di- $(C_1-C_6$ -alkyl)aminocarbonyl,  $N-(C_3-C_6$ -alkenyl)- $N-(C_1-C_6$ -alkyl)aminocarbonyl,  $N-(C_3-C_6$ -alkynyl)- $N-(C_1-C_6$ -alkyl)aminocarbonyl,  $N-(C_1-C_6$ -alkoxy)-

40      $N-(C_1-C_6$ -alkyl)aminocarbonyl,  $N-(C_3-C_6$ -alkenyl)- $N-(C_1-C_6$ -alkoxy)aminocarbonyl,  $N-(C_3-C_6$ -alkynyl)- $N-(C_1-C_6$ -alkoxy)aminocarbonyl, di- $(C_1-C_6$ -alkyl)-aminothiocarbonyl,  $C_1-C_6$ -alkylcarbonyl- $C_1-C_6$ -alkyl,  $C_1-C_6$ -alkoxyimino- $C_1-C_6$ -alkyl,

45      $N-(C_1-C_6$ -alkylamino)imino- $C_1-C_6$ -alkyl or  $N,N$ -di- $(C_1-C_6$ -alkylamino)imino- $C_1-C_6$ -alkyl, where the abovementioned alkyl, cycloalkyl and alkoxy radicals may be partially or fully halogenated



## 95

hydroxycarbonyl, C<sub>1</sub>—C<sub>4</sub>—alkylaminocarbonyl,  
di—(C<sub>1</sub>—C<sub>4</sub>—alkyl)aminocarbonyl, aminocarbonyl,  
C<sub>1</sub>—C<sub>4</sub>—alkylcarbonyloxy or C<sub>3</sub>—C<sub>6</sub>—cycloalkyl;

5 phenyl, heterocyclyl, phenyl—C<sub>1</sub>—C<sub>6</sub>—alkyl,  
heterocyclyl—C<sub>1</sub>—C<sub>6</sub>—alkyl, phenoxy, heterocyclyoxy,  
where the phenyl and the heterocyclyl radical of  
the last-mentioned substituents may be partially  
or fully halogenated and/or may carry one to three  
10 of the following radicals:  
nitro, cyano, C<sub>1</sub>—C<sub>4</sub>—alkyl, C<sub>1</sub>—C<sub>4</sub>—haloalkyl,  
C<sub>1</sub>—C<sub>4</sub>—alkoxy or C<sub>1</sub>—C<sub>4</sub>—haloalkoxy;

15 R<sup>10</sup> is C<sub>1</sub>—C<sub>6</sub>—alkyl, C<sub>3</sub>—C<sub>6</sub>—alkenyl, C<sub>3</sub>—C<sub>6</sub>—haloalkenyl,  
C<sub>3</sub>—C<sub>6</sub>—alkynyl, C<sub>3</sub>—C<sub>6</sub>—haloalkynyl, C<sub>3</sub>—C<sub>6</sub>—cycloalkyl,  
hydroxyl, C<sub>1</sub>—C<sub>6</sub>—alkoxy, C<sub>3</sub>—C<sub>6</sub>—alkenyloxy,  
C<sub>3</sub>—C<sub>6</sub>—alkynyloxy, amino, C<sub>1</sub>—C<sub>6</sub>—alkylamino,  
di—(C<sub>1</sub>—C<sub>6</sub>—alkyl)amino or C<sub>1</sub>—C<sub>6</sub>—alkylcarbonylamino,  
where the abovementioned alkyl, cycloalkyl and  
20 alkoxy radicals may be partially or fully  
halogenated and/or may carry one to three radicals  
from the following group:  
cyano, C<sub>1</sub>—C<sub>4</sub>—alkoxy, C<sub>1</sub>—C<sub>4</sub>—alkylthio,  
di—(C<sub>1</sub>—C<sub>4</sub>—alkyl)amino, C<sub>1</sub>—C<sub>4</sub>—alkylcarbonyl,  
C<sub>1</sub>—C<sub>4</sub>—alkoxycarbonyl,  
25 C<sub>1</sub>—C<sub>4</sub>—alkoxy—C<sub>1</sub>—C<sub>4</sub>—alkoxycarbonyl,  
di—(C<sub>1</sub>—C<sub>4</sub>—alkyl)amino—C<sub>1</sub>—C<sub>4</sub>—alkoxycarbonyl,  
hydroxycarbonyl, C<sub>1</sub>—C<sub>4</sub>—alkylaminocarbonyl,  
di—(C<sub>1</sub>—C<sub>4</sub>—alkyl)aminocarbonyl, aminocarbonyl,  
30 C<sub>1</sub>—C<sub>4</sub>—alkylcarbonyloxy or C<sub>3</sub>—C<sub>6</sub>—cycloalkyl;

35 phenyl, heterocyclyl, phenyl—C<sub>1</sub>—C<sub>6</sub>—alkyl or  
heterocyclyl—C<sub>1</sub>—C<sub>6</sub>—alkyl, where the phenyl or  
heterocyclyl radical of the four last-mentioned  
substituents may be partially or fully halogenated  
and/or may carry one to three of the following  
radicals:  
nitro, cyano, C<sub>1</sub>—C<sub>4</sub>—alkyl, C<sub>1</sub>—C<sub>4</sub>—haloalkyl,  
C<sub>1</sub>—C<sub>4</sub>—alkoxy or C<sub>1</sub>—C<sub>4</sub>—haloalkoxy;

40 R<sup>11</sup>, R<sup>12</sup> are C<sub>1</sub>—C<sub>6</sub>—alkyl, C<sub>3</sub>—C<sub>6</sub>—alkenyl, C<sub>3</sub>—C<sub>6</sub>—alkynyl or  
C<sub>1</sub>—C<sub>6</sub>—alkylcarbonyl;

45 1 is 0 to 6;  
m is 2 to 4;

n is 1 to 5;

p is 2 to 5;

5 and their agriculturally useful salts.

2. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1, where

10 R<sup>1</sup> is halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, heterocyclyloxy or phenylthio, where the two last-mentioned radicals may be partially or fully halogenated and/or may carry one to three of the substituents mentioned below:

15 nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

20 R<sup>5</sup> is halogen, OR<sup>7</sup>, SR<sup>7</sup>, SOR<sup>8</sup>, SO<sub>2</sub>R<sup>8</sup>, OSO<sub>2</sub>R<sup>8</sup>, OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup>, OPSR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy.

25 3. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claim 1 or 2, where

30 R<sup>5</sup> is halogen, OR<sup>7</sup>, NR<sup>10</sup>R<sup>11</sup> or N-bonded heterocyclyl which may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy.

35 4. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claims 1 to 3, where

40 R<sup>7</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl, (C<sub>1</sub>-C<sub>20</sub>-alkylthio)carbonyl, N,N-di-(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl, phenyl, phenylcarbonyl or phenoxy-C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, where the phenyl radical of the three last-mentioned substituents may be partially or fully halogenated and/or may carry one to three of the following radicals:  
nitro, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or C<sub>1</sub>-C<sub>4</sub>-haloalkoxy;

R<sup>10</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-alkoxy;

R<sup>11</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl.

5 5. A cyclohexenonequinolinoyl derivative of the formula I as claimed in claims 1 to 4, where

R<sup>6</sup> is nitro, halogen, cyano, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkoxy)methyl, di-(C<sub>1</sub>-C<sub>6</sub>-alkylthio)methyl, 10 (C<sub>1</sub>-C<sub>6</sub>-alkoxy)(C<sub>1</sub>-C<sub>6</sub>-alkylthio)-methyl, hydroxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-haloalkoxy, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyloxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-haloalkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, 15 C<sub>1</sub>-C<sub>6</sub>-haloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>-alkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-haloalkylcarbonyl, C<sub>1</sub>-C<sub>6</sub>-alkoxycarbonyl or C<sub>1</sub>-C<sub>6</sub>-haloalkoxycarbonyl;

or

20 two radicals R<sup>6</sup>, which are linked to the same carbon, together form an -O-(CH<sub>2</sub>)<sub>m</sub>-O-, -O-(CH<sub>2</sub>)<sub>m</sub>-S-, -S-(CH<sub>2</sub>)<sub>m</sub>-S-, -O-(CH<sub>2</sub>)<sub>n</sub>- or -S-(CH<sub>2</sub>)<sub>n</sub> chain which may be substituted by one to three radicals from 25 the following group: halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

or

30 two radicals R<sup>6</sup>, which are linked to the same carbon, together form a -(CH<sub>2</sub>)<sub>p</sub> chain which may be interrupted by oxygen or sulfur and/or may be substituted by one to four radicals from the 35 following group: halogen, cyano, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl or C<sub>1</sub>-C<sub>4</sub>-alkoxycarbonyl;

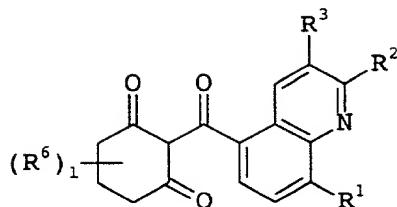
or

40 two radicals R<sup>6</sup>, which are linked to the same carbon, together with this carbon form a carbonyl group.

6. A process for preparing compounds of the formula I as claimed in claims 1 to 5 where R<sup>5</sup> = halogen, which comprises reacting 45 a cyclohexanedione derivative of the formula III,

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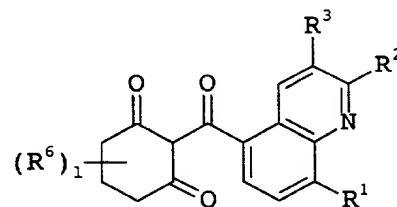


III

10 where the variables R<sup>1</sup> to R<sup>3</sup>, R<sup>6</sup> and l are each as defined in claims 1 to 5, with a halogenating agent.

15 7. A process for preparing compounds of the formula I as claimed in claims 1 to 5 where R<sup>5</sup> = OR<sup>7</sup>, OSO<sub>2</sub>R<sup>8</sup>, OPR<sup>8</sup>R<sup>9</sup>, OPOR<sup>8</sup>R<sup>9</sup> or OPSR<sup>8</sup>R<sup>9</sup>, which comprises reacting a cyclohexanedione derivative of the formula III,

20

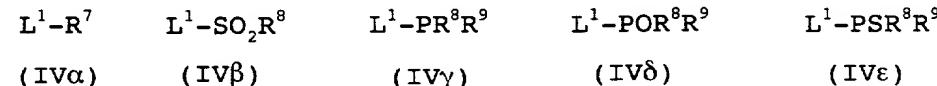


III

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where the variables R<sup>1</sup> to R<sup>3</sup>, R<sup>6</sup> and l are each as defined in claims 1 to 5, with a compound of the formula IV $\alpha$ , IV $\beta$ , IV $\gamma$ , IV $\delta$  or IV $\varepsilon$ ,

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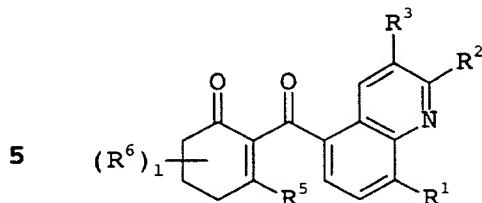


where the variables R<sup>7</sup> to R<sup>9</sup> are each as defined in claims 1 to 5 and L<sup>1</sup> is a nucleophilically replaceable leaving group.

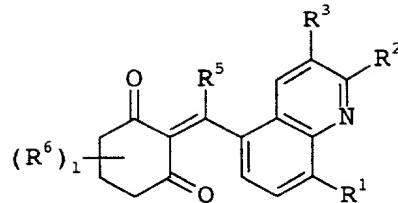
35 8. A process for preparing compounds of the formula I as claimed in claims 1 to 5 where R<sup>5</sup> = OR<sup>7</sup>, SR<sup>7</sup>, POR<sup>8</sup>R<sup>9</sup>, NR<sup>10</sup>R<sup>11</sup>, ONR<sup>11</sup>R<sup>12</sup>, N-linked heterocyclyl or O-(N-linked heterocyclyl), which comprises reacting a compound of the formula Ia (= I where R<sup>5</sup> = halogen, OSO<sub>2</sub>R<sup>8</sup>),

40

45



and/or

I where  $R^5$  = halogen or  $OSO_2R^8$ 

10

where the variables  $R^1$  to  $R^3$ ,  $R^6$  and  $l$  are each as defined in claims 1 to 5, with a compound of the formula  $V\alpha$ ,  $V\beta$ ,  $V\gamma$ ,  $V\delta$ ,  $V\epsilon$ ,  $V\eta$  or  $V\theta$ ,

15

$HOR^7$	$HSR^7$	$HPOR^8R^9$	$HNR^{10}R^{11}$	$HONR^{11}R^{12}$
( $V\alpha$ )	( $V\beta$ )	( $V\gamma$ )	( $V\delta$ )	( $V\epsilon$ )

$H(N$ -linked heterocyclyl)

$H(ON$ -linked heterocyclyl)

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( $V\eta$ )

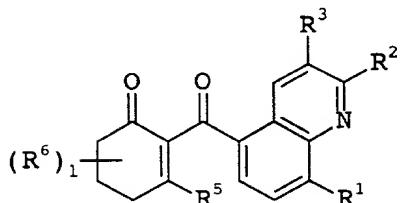
( $V\theta$ )

where the variables  $R^7$  to  $R^{12}$  are each as defined in claims 1 to 5, if appropriate in the presence of a base.

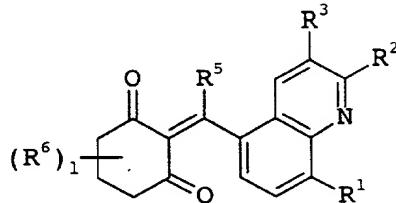
25 9.

A process for preparing compounds of the formula I as claimed in claims 1, 2 or 5, where  $R^5 = SOR^8$ ,  $SO_2R^8$ , which comprises reacting a compound of the formula  $I\beta$  ( $= I$  where  $R^5 = SR^8$ ),

30



and/or



35

I where  $R^5 = SR^8$

40

where the variables  $R^1$  to  $R^8$  and  $l$  are each as defined in claims 1, 2 or 5, with an oxidizing agent.

45

10. A composition, comprising a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of I as claimed in claims 1 to 5 and auxiliaries which are customarily used for formulating crop protection agents.

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11. A process for preparing compositions as claimed in claim 10, which comprises mixing a herbicidally effective amount of at least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of I as claimed in claims 5 1 to 5 and auxiliaries which are customarily used for formulating crop protection agents.

12. A method for controlling undesirable vegetation, which comprises allowing a herbicidally effective amount of at 10 least one cyclohexenonequinolinoyl derivative of the formula I or an agriculturally useful salt of I as claimed in claims 1 to 5 to act on plants, their habitat and/or on seeds.

13. The use of cyclohexenonequinolinoyl derivatives of the 15 formula I or their agriculturally useful salts as claimed in claims 1 to 5 as herbicides.

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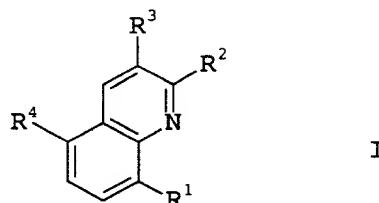
## Cyclohexenonequinolinoyl derivatives

## Abstract

5

Cyclohexenonequinolinoyl derivatives of the formula I

10



15 where:

15      R<sup>1</sup>      is hydrogen, nitro, halogen, cyano, alkyl, haloalkyl, alkoxyiminomethyl, alkoxy, haloalkoxy, alkylthio, C<sub>1</sub>–C<sub>6</sub>–haloalkylthio, alkylsulfinyl, haloalkylsulfinyl, alkylsulfonyl, haloalkylsulfonyl, unsubstituted or substituted amino sulfonyl, unsubstituted or substituted sulfonyl amino, unsubstituted or substituted phenoxy, unsubstituted or substituted heterocyclyloxy, unsubstituted or substituted phenylthio or unsubstituted or substituted heterocyclylthio;

20      R<sup>2</sup>, R<sup>3</sup>      are hydrogen, alkyl, haloalkyl or halogen;

25      R<sup>4</sup>      is substituted (3-oxo-1-cyclohexen-2-yl)carbonyl or substituted (1,3-dioxo-2-cyclohexyl)methylidene;

30      and their agriculturally useful salts;

35      processes for preparing the cyclohexenonequinolinoyl derivatives; compositions comprising them, and the use of these derivatives or compositions comprising them for controlling undesirable plants are described.

40

45

# Declaration, Power of Attorney

Page 1 of 6

0050/049365

We (I), the undersigned inventor(s), hereby declare(s) that:

My residence, post office address and citizenship are as stated below next to my name,

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Cyclohexenonequinolinoyl derivatives

the specification of which

is attached hereto.

was filed on \_\_\_\_\_ as

Application Serial No. \_\_\_\_\_

and amended on \_\_\_\_\_.

was filed as PCT international application

Number PCT/EP99/06322

on August 27, 1999

and was amended under PCT Article 19

on \_\_\_\_\_ (if applicable).

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations.

We (I) hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed. Prior Foreign Application(s)

Application No.	Country	Day/Month/Year	Priority Claimed
19840799.8	Germany	08 September 1998	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

We (I) hereby claim the benefit under Title 35, United States Codes, § 119(e) of any United States provisional application(s) listed below.

\_\_\_\_\_  
(Application Number) \_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Application Number) \_\_\_\_\_  
(Filing Date)

We (I) hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

PCT/US2002/02650

Application Serial No.	Filing Date	Status (pending, patented, abandoned)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

And we (I) hereby appoint **Messrs. HERBERT. B. KEIL**, Registration Number 18,967; and **RUSSEL E. WEINKAUF**, Registration Number 18,495; the address of both being **Messrs. Keil & Weinkauf, 1101 Connecticut Ave., N.W., Washington, D.C. 20036** (telephone 202-659-0100), our attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign the drawings, to receive the patent, and to transact all business in the Patent Office connected therewith.

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Declaration

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0050/049365

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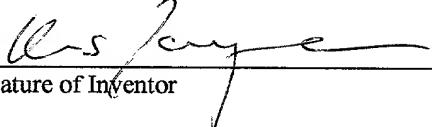
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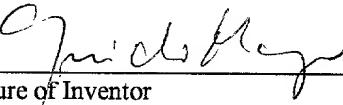
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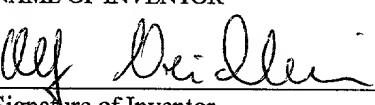
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